

## Chapter 3. Affected Environment

### Introduction

This chapter describes the existing physical, biological, cultural, social, and economic characteristics of the Alturas Field Office (AFO) planning area, representing 503,045 acres in four counties in northeastern California. The affected environment defines the baseline of existing conditions from which possible impacts of the plan alternatives may be analyzed. The majority of the data was provided by the Bureau of Land Management (BLM) AFO; federal, state, county, and local agencies; various organizations; and other public and private sources. Data include published and unpublished reports, maps, and geographic information system (GIS) information.

A majority of the lands administered by the AFO are located in the Modoc Plateau of the Great Basin Province, as described in The Jepson Manual (Hickman 1993). The remainder of the AFO area (i.e., the area along the western boundary) is within the Cascade Range region of the California Floristic Province. Because the AFO area is located within the transition zone between these two floristic provinces, a portion of the AFO area exhibits floristic elements of both the Great Basin and the Cascade Range foothills. In the transition zone, these elements mix, plant communities intergrade with little clear demarcation, and plant alliances become ecotonal.

The AFO planning area includes most of Modoc County, except for an area on the east side of the county (generally east of the Warner Mountains) that is within the planning area of the Surprise Field Office. The planning area includes the City of Alturas, which is where the BLM administrative offices are located; and the communities of Adin, Canby, Davis Creek, Day, Likely, Lookout, Newell, New Pine Creek, and Tionesta.

In Lassen County, the planning area includes the communities of Bieber, Madeline, Little Valley, Nubieber, and Pittville; Termo is immediately adjacent to the area. It should be noted that although Modoc County has the largest amount of area within the AFO planning area (approximately 53%), the greatest share of actual BLM land managed by the AFO is in Lassen County. Approximately 52% of BLM land managed by the AFO is in Lassen County and 29.4% is in Modoc County.

Approximately 331,334 acres of the AFO planning area and 46,522 acres of BLM land are located in Shasta County. Shasta County communities in the planning area include Burney, Cassel, Dana, Fall River Mills, Glenburn, Hat Creek, Johnson Park, and McArthur.

Approximately 889,956 acres of the planning area and 42,712 acres of BLM land are located in Siskiyou County. The communities of Tulelake, Macdoel, and Mt. Hebron are located in the planning area. Dorris is immediately adjacent to the planning area.

Dominant vegetation types include mountain big sagebrush, mixed sage–western juniper, western juniper, conifer, and riparian formations. Large animal species that characterize the area include deer, pronghorn antelope, mountain lion, coyote, and black bear; wild horses are also present. Principal uses of the lands include livestock grazing, developed agriculture, forestry, and recreation.

## 3.1 Air Resources

The AFO area is located in Modoc County and lies in the Northeast Plateau Air Basin (NPAB). The NPAB includes Siskiyou, Modoc, and Lassen Counties. The Modoc County Air Pollution Control District has jurisdiction over air quality issues throughout Modoc County. It administers air quality regulations developed at federal, state, and local levels.



### 3.1.1 Current Conditions

#### 3.1.1.1 Climate and Topography

Weather in northern California is dominated by the position of the Eastern Pacific high pressure cell that is normally located off the coast of North America. Due to the positioning of this cell, an almost unbroken chain of winter storms occurs in the study area, and the bulk of the precipitation in the study area occurs during this winter storm period. Weather systems in the region usually result in strong winds and unstable air masses, providing for good dispersion conditions. During fair weather periods, stable air conditions prevail throughout the region.

During spring, the movement of the Pacific high pressure cell results in a decline of precipitation in the project vicinity. Spring conditions are rarely warm and dry, due to unstable conditions that result in rain and snow. Dry, warm conditions are characteristic of the summer months, although thunderstorms are not uncommon. The transitional period between summer and winter/spring is generally characterized by cool, clear days and evening temperatures that drop below freezing.

The existing air quality conditions in the AFO area are reflected by monitoring data collected in the region. Air quality monitoring data for 1999 through 2001 (the most recent years available) are presented in Table 3.1-1. The closest monitoring station is located at the West 4th Street monitoring station in Alturas.

As shown in Table 3.1-1, the AFO area has experienced violations of the state's  $PM_{10}$  (particulate matter less than 10 micrometers in diameter) standards during the last 3 years. The federal and state governments have established ambient air quality standards for six criteria pollutants: ozone ( $O_3$ ), carbon monoxide (CO), nitrogen dioxide ( $NO_2$ ), sulfur dioxide ( $SO_2$ ),  $PM_{10}$ , and lead (Pb). The state and federal ambient air quality standards are summarized in Table 3.1-2 (at the end of this subsection).  $O_3$  and  $PM_{10}$  are generally considered to be regional pollutants because they or their precursors affect air quality on a regional scale. Pollutants such as CO,  $NO_2$ ,  $SO_2$ , and Pb are considered to be local pollutants because they tend to accumulate in the air locally. Particulate matter ( $PM_{10}$  and particulate matter less than 2.5 micrometers in diameter [ $PM_{2.5}$ ]) is also considered to be a localized pollutant.

In the AFO area, particulate matter is the primary pollutant of concern. During the summer months, when wildfires and prescribed burns are a significant source of airborne particulate matter, frequent dry periods can result in infrequent instances of mixing and ventilation, resulting in higher levels of particulate matter. During the winter months, particulate matter from wood-burning stoves and furnaces used for heating often results in increased levels of airborne particulate matter. During these times, air quality is less likely to meet state and federal attainment status. Table 3.1-3 summarizes the state and federal attainment designations for Modoc County.

**Table 3.1-1** Ambient Air Quality Monitoring Data at the Alturas West 4th Street Monitoring Station (1999–2001)

Pollutant Standard	1999	2000	2001
Particulate Matter (PM <sub>10</sub> )			
Maximum 24-hour concentration (µg/m <sup>3</sup> )	94.0	79.2	66.6
Second highest 24-hour concentration (µg/m <sup>3</sup> )	73.4	58.8	47.0
Average geometric mean concentration (µg/m <sup>3</sup> )	22	17	16
Average arithmetic mean concentration (µg/m <sup>3</sup> )	26	22	19
Number of Days PM <sub>10</sub> Standard Exceeded <sup>a</sup>			
CAAQS 24-hour (>50 µg/m <sup>3</sup> ) <sup>b</sup>	30	18	6
NAAQS 24-hour (>150 µg/m <sup>3</sup> ) <sup>b</sup>	0	0	0
Particulate Matter (PM <sub>2.5</sub> )			
Maximum 24-hour concentration (µg/m <sup>3</sup> )	40.0	38.0	35.0
Second highest 24-hour concentration (µg/m <sup>3</sup> )	27.0	37.0	32.0
Average arithmetic mean concentration (µg/m <sup>3</sup> )	7.9	8.5	7.6
Number of Days PM <sub>2.5</sub> Standard Exceeded <sup>a</sup>			
NAAQS 24-hour (>65 µg/m <sup>3</sup> ) <sup>c</sup>	0	0	0

Notes:

µg/m<sup>3</sup> = micrograms per cubic meter  
 CAAQS = California ambient air quality standards.  
 NA = Not applicable.  
 NAAQS = National ambient air quality standards.

<sup>a</sup> The number of days above the standard is not necessarily the number of violations of the standard for the year.

<sup>b</sup> Calculated exceedances are based on measurements taken every 6 days.

<sup>c</sup> Calculated exceedances are based on measurements taken every 3 or 6 days, depending on the time of year and the site's monitoring schedule.

Sources: California Air Resources Board 2003, U.S. Environmental Protection Agency 2003.

**Table 3.1-3** Attainment Status for Criteria Pollutants of Concern in the Modoc County Air Pollution Control District

Particulate Matter Less Than 10 Microns		Particulate Matter Less Than 2.5 Microns		Carbon Monoxide		Ozone	
Federal	State	Federal	State	Federal	State	Federal	State
Unclassified	Non-attainment	Unclassified	NA	Unclassified/attainment	Unclassified	Unclassified/attainment	Attainment

Note: NA = Not applicable.

### 3.1.1.2 Air Quality Pollutants

#### Ozone

O<sub>3</sub> is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections. O<sub>3</sub> can cause substantial damage to vegetation and other materials. It is a severe eye, nose, and throat irritant. O<sub>3</sub> also attacks synthetic rubber, textiles, plants, and other materials, and can cause extensive cell damage and leaf discoloration in plants.

O<sub>3</sub> is not emitted directly into the air but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include reactive organic gases and oxides of nitrogen, react in the atmosphere in the presence of sunlight to form O<sub>3</sub>. Because photochemical reaction rates increase when the intensity of ultraviolet light and air temperature increase, O<sub>3</sub> is primarily a summer air pollution problem. The ozone precursors (reactive organic gases and nitrogen oxides) are emitted by stationary combustion engines and mobile sources, such as construction equipment.

### Carbon Monoxide

CO essentially has no effect on plants and materials but can significantly affect human health. It is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream. Effects on humans range from slight headaches to nausea to death.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter, when periods of light winds combine with the formation of ground-level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also emit more CO at low air temperatures.

### Particulate Matter

Particulates can damage human health and retard plant growth. Health concerns associated with suspended particulate matter focus on those particles small enough to reach the lungs when inhaled. Particulates also reduce visibility and corrode materials.

Emissions of particulate matter are generated by a wide variety of sources, including agricultural activities, industrial emissions, dust suspended by vehicle traffic and construction equipment, and secondary aerosols formed by reactions in the atmosphere.

#### 3.1.2 Trends

Information provided by BLM staff indicates that the following activities contribute to emissions in the AFO area (Whitcome, personal communication.):

- Wildfires (beyond management control),
- Prescribed fires (piles and broadcast),
- Heavy equipment use,
- Road construction and maintenance,
- Reservoir construction and maintenance,
- Chainsaw use on fuels and fire projects, and
- Field work by BLM employees (e.g., vehicles and all-terrain vehicles).

BLM activities would continue to generate emissions of criteria pollutants, particularly inhalable particulate matter. The substantial generation of particulate matter, particularly from wildfires and prescribed fires, is anticipated to result in a detrimental effect on air quality in the region.

**Table 3.1-2 Ambient Air Quality Standards Applicable in California**

Pollutant	Symbol	Average Time	Standard (parts per million)		Standard ( $\mu\text{g}/\text{m}^3$ )		Violation Criteria	
			California	National	California	National	California	National
Ozone	O <sub>3</sub>	1 hour	0.09	0.12	180	235	If exceeded	If exceeded on more than 1 day per year
		8 hours	NA	0.08	NA	157	NA	If fourth highest 8-hour concentration in a year, averaged over 3 years, is exceeded at each monitor within an area
Carbon monoxide	CO	8 hours	9	9	10,000	10,000	If exceeded	If exceeded on more than 1 day per year
		1 hour	20	35	23,000	40,000	If exceeded	If exceeded on more than 1 day per year
CO at Lake Tahoe only	CO	8 hours	6	NA	7,000	NA	If equaled or exceeded	NA
Nitrogen dioxide	NO <sub>2</sub>	Annual average	NA	0.053	NA	100	NA	If exceeded on more than 1 day per year
		1 hour	0.25	NA	470	NA	If exceeded	NA
Sulfur dioxide	SO <sub>2</sub>	Annual average	NA	0.03	NA	80	NA	If exceeded
		24 hours	0.04	0.14	105	365	If exceeded	If exceeded on more than 1 day per year
		1 hour	0.25	NA	655	NA	If exceeded	NA
Hydrogen sulfide	H <sub>2</sub> S	1 hour	0.03	NA	42	NA	If equaled or exceeded	NA
Vinyl chloride	C <sub>2</sub> H <sub>3</sub> Cl	24 hours	0.01	NA	26	NA	If equaled or exceeded	NA
Inhalable particulate matter	PM <sub>10</sub>	Annual geometric mean	NA	NA	20	NA	If exceeded	NA
		Annual arithmetic mean	NA	NA	NA	50	NA	If exceeded at each monitor within area
		24 hours	NA	NA	50	150	If exceeded	If exceeded on more than 1 day per year
	PM <sub>2.5</sub>	Annual geometric mean	NA	NA	12	NA	If exceeded	NA
		Annual arithmetic mean	NA	NA	NA	15	NA	If 3-year average from single or multiple community-oriented monitors is exceeded
		24 hours	NA	NA	NA	65	NA	If 3-year average of 98th percentile at each population-oriented monitor within an area is exceeded
Sulfate particles	SO <sub>4</sub>	24 hours	NA	NA	25	NA	If equaled or exceeded	NA
Lead particles	Pb	Calendar quarter	NA	NA	NA	1.5	NA	If exceeded no more than 1 day per year
		30-day average	NA	NA	1.5	NA	If equaled or exceeded	NA

## 3.2 Cultural Resources and Paleontology

Cultural resource sensitivity within the AFO area is generally considered to be high. Archaeological site types that are representative of the Great Basin, California, and Columbia Plateau cultures can be found across the area. While each culture area possesses its own unique adaptations, similarities among site types exist. In general, prehistoric site types found in the Alturas area are semi-permanent camps, temporary camps, hunting related sites, plant processing locales, rock features, rock art locales and quarry sites.



**Muck Village**

Historic site types in the AFO area are typically related to ranching and logging operations, as well as transportation related resources such as the Lassen-Applegate Trail, the Yreka trail, military routes and a number of toll roads. There are 1,700 recorded cultural resource sites in the AFO area; 85% of these are prehistoric and 15% are historic. Only one site is listed in the National Register of Historic Places (NRHP), although it is likely that additional sites possess characteristics that would meet established NRHP eligibility criteria. Three culturally related areas of critical environmental concern (ACECs) have been identified, but have not received the ACEC designation as yet.

In addition to the erosional processes from wind and water, the major effects on cultural resources are site deflation or disturbance from grazing (of both domestic livestock and wild horses) and recreational vehicle use, vandalism in the form of surface collecting, and fire suppression activities. In general, cultural resources throughout the AFO area have received little active management in the past. A number of gaps within the cultural resource database have been identified and are currently being addressed. Although most surveys that were required under Section 106 of the National Historic Preservation Act have been documented, very little Section 110 survey information from before 1999 is available. Very few sites have been evaluated for the NRHP, although a number have been identified as being eligible. Without increased survey, evaluation, and mitigation, it is likely that such sites will lose what cultural or scientific information that would make them eligible for the NRHP.

A Class I Cultural Resource Overview that synthesizes all available data for Northeastern California was prepared in 2004 by Far Western Anthropological Research Group. Unless otherwise noted, the following chronological summary is taken from this document.

### 3.2.1 Prehistoric Context

#### ***Chronology***

Prehistoric occupation of the project area, commencing approximately 12,000 years ago, has been divided into six separate periods, each with distinctive life ways and land use patterns (Delacorte 1997). The initial occupation, the Early Holocene period (ca. +7,000 before present [BP]), is characterized by highly mobile foragers who traveled from one valley system to another focusing of the food resources found near lakeshores and wetlands.

The Post-Mazama period (ca. 7,000-5,000 BP), signals the first significant use of upland zones of the project area, as well as increasing settlement activity near prominent sources of water. The latter may have resulted from severe drought, as smaller springs and streams took on new importance as once-productive wetlands and lakes disappeared.

The next occupation, the Early Archaic period (5,000-3,500 BP), is marked by major increases in archaeological visibility with artifacts and sites dating to this time occurring in a wide range of geographic contexts. Obsidian and basalt quarry production, the latter the hallmark of the Martis Complex centered near Lake Tahoe, begin to accelerate during this period.

This trend continues through the Middle Archaic period (3500-1,500 BP), which represents both within the project area and throughout California somewhat of a “golden age” recognized by the appearance of large, semi-sedentary villages, as well as elaborations in material culture, house construction, obsidian and basalt production, and ceremonial and settlement activity directed at the hunting of large game.

The transition from the Middle to the Late Archaic period (1,300-600 BP) produced major changes in assemblage structure, subsistence, and settlement practices. At about 1,000 BP, large-scale obsidian quarry production collapses, many of the previously occupied villages are abandoned, and subsistence activities are increasingly directed at a few key root crops. Drought, population-resource imbalances, and chronic warfare have all been cited as potential causes for these dramatic changes. The final phase of prehistoric occupation, the Terminal Prehistoric period (600 BP-Contact), is marked by the arrival of Numic-speaking groups into much of the Great Basin portion of the project area. Settlements have a “stand alone” domestic quality, as might be expected by a series of dispersed, short-term occupation by small family units. There is also continuing evidence of conflict associated with the arrival of new peoples into this boundary land separating California from the Great Basin.

### 3.2.2 Ethnographic Context

#### 3.2.2.1 Modoc

Modoc territory centered on Lower Klamath, Tule, and Clear Lakes and the Lost River, which flows between Clear and Tule Lakes (Kroeber 1925, Ray 1963, Merriam and Talbot 1974).

In the pre-contact period the Modoc people lived on both sides of what is now the California-Oregon border and immediately east of the Cascade Range. They spoke a dialect of the Plateau Penutian family (Stern 1998:446) which, along with their close relatives and neighbors to the north, the Klamath, formed a linguistically isolated unit known as Lutuamian (Shipley 1978). Their language was unintelligible to their neighbors in every direction (Ray 1963). Traditional Modoc tribal territory was divided into three geographic areas, with the residents of each area known by a different name: Gumbatwas (“people of the west”), the Paskanwas (“river people”), and the Kokiwas (“people of the far-out country”) (Ray 1963).

Although there are several ethnographic resources available, Ray’s monograph (1963) is the most comprehensive, detailed, and integrative source for the Modoc. His data contribute information regarding a full range of cultural and social aspects, and additionally he identifies a number of villages and religious sites, although his locations are of an extremely general nature (Ray 1963:201-211; see also Spier 1930). Since most of their lives were spent in the lacustrine settings of the Klamath Basin, the resources that were locally abundant formed the basis of the subsistence round for this group. Life revolved around the seasonal harvest of fish, waterfowl, and tules or wokus. Beginning in the spring, with the annual sucker runs in the Upper Klamath Lake and the Lost River, people would leave their winter villages behind and travel to the fishing grounds. During these runs, everyone was kept busy processing the catch to store for the winter. Once the sucker runs slackened, Modoc women began gathering upland plant foods such as biscuitroot (*Lomatium canbyi*) and epos (*Perideridia* spp.). During this time, waterfowl eggs were also gathered.

In July, the yellow pond lily (*Nuphar polysepalum*) ripened in Modoc country and was harvested. For the Modoc, this harvest was preceded by first-fruits rite presided over by a shaman (Stern 1998). Later, as other plant resources became available, the women went out and gathered plants in groups. During this time, the men were occupied with hunting upland game.

Deer and pronghorn antelope were often taken by a single hunter in deer headdress, or by groups of hunters who, through the use of fire or other methods, 'herded' these animals into makeshift corrals or pounds, where they could be easily dispatched. In the early fall, people gathered cherries, plums, and other fruits and nuts.

Extended trips in the nearby uplands and further abroad saw the men hunting, while the women picked berries. By October, most people had returned to their winter villages to rebuild the semi-subterranean lodges and hold communal ceremonies. Food that had been dried and temporarily stored was placed into more permanent storage pits in the villages. The return of cold weather saw families firmly ensconced in winter villages, relying for the most part on stored foods to see them through to the next spring sucker run.

Permanent winter villages were established in the river valleys, such as Lost River Valley, and along the Lower Klamath and Tule Lakes. Winter settlements varied in size, but some were rather large (ca. 100 people) and were continually occupied (Stern 1998:451). Social life was most elaborate in the winter villages where family groups congregated after an extended period of hunting, fishing, and gathering. The Modoc were served by three separate types of leaders: a political leader or chief, a war leader, and a shaman. The Modoc understood the world as a flat disc that the creator, Kumookumts, had generated from a hill on the east side of Tulelake (Ray 1963:20). The land of the dead, where human spirits went after death, was in the west, and malicious influences flowed from that direction (Ray 1963:20). Consequently, house doors opened to one of the other directions to prevent these negative influences from entering, and people preferred not to sleep in the western portion of the house (Ray 1963:146).

### 3.2.2.2 Historical

The Applegate Emigrant Trail (Southern Road to Oregon) ran through Modoc territory, and in the 1850s the tribe became increasingly engaged in hostilities with the settlers and miners who entered the area. In 1864, the Modoc and Klamath signed a treaty which assigned reserve lands for both tribes in Klamath territory. With no land within their traditional territory set aside for them, the Modoc people reluctantly agreed to live on the Klamath agency. This arrangement proved unsatisfactory, however, for many of the Modoc.

A number of Modoc, led by Captain Jack, rebelled and left the Klamath agency to live at a traditional village on the Lost River. Agency efforts to force them back to the reserve resulted in the Modoc War of 1872-73, during which the Modoc retreated to a fortress-like sanctuary in the lava beds, where they held off U.S. troops for many months.

Upon their final surrender, the surviving Modoc insurgents and their supporters were sent to Oklahoma, returning only many years later to join the members of the tribe who had been allowed to remain at the Klamath agency (Murray 1959; Powers 1976; Ray 1962; Thompson 1971). Thus, by the time ethnographic efforts were pursued in the late nineteenth and early twentieth centuries, the Modoc had been effectively separated from their traditional lands. Many had spent most of their lives in Oklahoma, where the opportunities for passing on cultural information, especially about the traditional landscape, were greatly restricted (Voegelin 1942:48). Consequently, there is relatively less detailed information regarding Modoc lifeways and sites than is available for other tribes, who were able to maintain intimate knowledge of their aboriginal territory through continuous residence.

Ray's (1963) ethnogeographic information is the most comprehensive for the Modoc. He lists villages, cremation grounds, and ritual centers, which account for most of the principal settlements inhabited around the mid-1800s. Ethnographic site information is not included in this document.

### **3.2.2.3 The Pit River: Achumawi and Atsuge**

The Pit River Indians have traditionally inhabited a vast area of northeastern California which encompasses the mountainous Pit River drainage, from southern Goose Lake all the way to Big Bend, in Shasta County. Pit River tribes are comprised of two groups: the Achumawi, consisting of nine bands, and the Atsuge, with two bands (Garth 1978; Kniffen 1928:303; Olmsted and Stewart 1978). The Achumawi language and its distant relative, Atsuge, together form the Palaihnihan family, a member of the Hokan stock; each language contains dialects that correspond to the band divisions (Olmsted 1966; Shipley 1978). The nine bands of Achumawi are the Astarawi, Kosealekte, Hammawi, Hewisedawi, Atwamsini, Ajumawi, Ilmawi, Itsatawi, and Madesi. The Atsuge, who occupy the southern Pit River territory, consist of two bands: the Atsuge and the Aporige. Territorial boundaries of these nine bands may be found in (Kniffen) 1928, Merriam and Talbot (1974), and Garth (1953).

Pit River people on the west side of the field office area lived near the easternmost limits of salmon and acorns. Thus these items were incorporated into their subsistence economy. The eastern bands of the Achumawi focused their subsistence efforts on the many fish in the local streams, including pike minnows, suckers, trout, lamprey, as well as smaller minnow varieties (Olmsted & Stewart 1978). Men fished with spears in spring and summer, and set nets through the ice in winter. Fishing was exceptionally good at the forks of Pit River (in Kosalektawi territory). Deer hunting was excellent in the Warner Mountains, as well as on the plains north of the Pit River (Kniffen 1928). Deer were hunted throughout the year (Kniffen 1928). More distant groups were invited to take part in the fall deer drives held in the Warner foothills, and these guests brought dried salmon and acorns in exchange for this invitation (Kniffen 1928). The wetlands sustained numerous tubers, roots, and year-round and migratory waterfowl, which were supplemented by other vegetal resources in the surrounding grasslands and forests (Stewart 1978). Tules provided food and supplied fibers for house coverings, mats, twine, clothing, and rafts (Kniffen 1928, Olmsted and Stewart 1978). Even apparently barren sagebrush areas like the Madeline Plains yielded important resources, such as sage-grouse eggs in spring (Olmsted and Stewart 1978). Pit River women gathered important plant foods including epos roots that were dried in the sun and either eaten or stored for the following winter. Camas roots, other bulbs, "tule potatoes," and later in the season salmon berries, bear berries, juniper berries, wild plum, and wild buckwheat were available in the higher lands; these were dried or ground and stored for winter use (Kniffen 1928).

Traditionally, the Pit River bands established their permanent winter settlements in protected valleys, building substantial dwellings against the severe winter weather. Later in time, however, family groups may have remained in the uplands during mild winters to be near caches of roots (Delacorte 2000, Foster-Curley personal observation 2004). The basic structure usually served as a multi-family home, where all shared a central fire (Voegelin 1942, Garth 1953). Summer shelters at gathering camps typically were brush windbreaks (Kroeber 1925). The village was the basic political unit. Within the village, chiefs directed economic pursuits and determined when to move and when to conduct communal hunts (Garth 1953). While there was no overall tribal authority, popular chiefs were "influential far outside their own areas and could make decisions overriding those of lesser chiefs" (Garth 1978:237). Other officials potentially included an assistant chief, crier, and messenger (Voegelin 1942). A shaman oversaw the health of the community membership. Pit River peoples believed that the soul traveled to the western mountains at death, and they observed procedures to help the soul on its journey. If these steps were not taken, the ghost might return and try to take a companion, probably a close relative, with it (Olmsted and Stewart 1978:232). Thus the body was removed immediately from the house, wrapped in a hide or net, and cremated (Voegelin 1942).

### **3.2.2.4 Ethnohistory**

The Pit River bands, like their neighbors, the Modoc, experienced considerable conflict with the miners and settlers who invaded their lands in the 1850s. By 1859, many tribal members had been rounded up by the militia and driven to the multi-tribal reservation in Round Valley, in northern Mendocino County. By 1863, many of the Pit River people had escaped from Round Valley and returned to their traditional homes. As more and more of their ancestral hunting and fishing grounds were overrun by settlers, they naturally turned to another source of meat: the settler's cattle. This led to a series of retaliatory raids on native villages by the U.S. Army, whose main objective was to protect the settlers—either by killing the Indians or by forcibly moving them onto reservations. In 1867, Pit River people joined the Modoc in an uprising against the whites, which turned into a three-day battle, now known as the Battle of Infernal Caverns. Several men were killed on both sides, until the Indians finally escaped during the night through a system of underground passages in the basalt. An uneasy settlement was achieved the next year (Garth 1953, Wheeler-Voegelin 1974, Tiley 2000). Within four years of the Battle of Infernal Caverns, the Ghost Dance came to Lassen and Modoc counties, introduced by two Paiute men (DuBois 1939). The movement experienced a renaissance, known as the Earth Lodge Cult, when it swept back through the region from the Central Valley (DuBois 1939).

As the population of settlers grew and the native population and resources dwindled, the Pit River peoples “became largely dependent on the white settlers for jobs” (Gates 1983). Many of these people have continued to reside in their traditional homes and maintain an intimate knowledge of their lands.

### **3.2.3 Native American Traditional Values and Resources**

Native Americans have identified a number of places within the AFO area as being culturally significant (Roybal-Evans 1982). While many traditional sites are essentially landscape level in size (i.e., Payne Peak, Warren Peak, etc.) a number of them are very site-specific and constrained. Smaller sites are often related to good luck, power, or medicine and still play a significant part in the lives of native peoples. Larger sites are often related to hunting and gathering activities or quarrying locales and are still in use today by Native Americans. Other important sites identified with Native American traditional values are cemeteries and places such as the Infernal Caverns, where an historic battle between Native Americans and an armed military force took place in 1867. Native people are typically reluctant to identify specific sites as being culturally important until those sites are threatened by proposed projects. Native Americans have expressed concern over the use of herbicides, livestock grazing on sites, and energy-related development.

### **3.2.4 Historical Context**

Early historic-era land use in the region was mostly limited to exploitive economies (such as mining and logging) rather than settlement. Because of the rugged terrain, it was easier, safer, and cheaper to live elsewhere so most immigrants passed through the area rather than remaining in it. Nonetheless, non-native people have lived in the project area for over 150 years and have made many alterations to its landscape. These alterations can be generalized by land use themes such as transportation (including the historic Lassen-Applegate and Yreka trails), mining, agriculture and ranching, military development, urbanization, logging, electrical development, resource management, and tourism. Archaeological remains associated with each theme most frequently represent the technological aspects of each industry or theme and its social and economic elements, such as domestic living areas.

Historic themes in the AFO include the Native American conflicts in the 1860s and 1870s, twentieth century federal land use from large-scale reclamation programs, and war-time internment camps.

While the Tululake Basin and the Pit River Valley became dominated by agriculture, the economy of the Modoc Plateau focused on logging operations. Some mining also occurred in the southeastern region of the district, although most has consisted of non-mineral quarrying.

### **3.2.5 Factors Currently Affecting Cultural Resources**

Historically, two factors have altered the integrity of cultural resources in the AFO area and continue to do so currently, accounting for the present condition of many sites. These factors are:

- 1) **Reduction of vegetation and overgrazing.** The reduction of vegetative cover and associated erosion has visibly affected open sites—both those confined to surface scatters and those with vertical deposits. In many instances, soil erosion and slope wash have contributed to lateral displacement and downslope consolidation of surface scatters occurring in terrain of greater than 5% slope. They also have accelerated the attrition of the upper levels of deeper deposits. Throughout the area, the contents of sites are being exposed on the surface and their contexts are being washed away. The tendency of wind action to remove loosened fine, dry silts, and clays augments this erosional process. Recent monitoring data has noted serious impacts to cultural resources as a result of grazing activities (Foster-Curley 2003). These impacts are typically related to livestock trampling, wallowing, and trailing through sites. Livestock hoof action can significantly affect the surface and subsurface deposits of a site, hopelessly mixing archaeological contexts and rendering such sites ineligible for the NRHP. On sparse to moderate lithic scatters, these impacts can be devastating, resulting in the complete loss of the site. The lack of long-term monitoring data makes it impossible to determine how many other sites have been affected in a similar manner. Cultural resource surveys and monitoring data in 2004 show that in some areas up to half of the recorded sites have been affected by grazing activities.
- 2) **Vandalism/Looting.** Archaeological sites within the AFO area have sustained repeated illegal artifact collection. Most sites that are easily accessible lack "collection quality" artifacts of both flaked stone tools and groundstone. Surface collection has been a favorite recreational activity throughout the region, as evidenced by the many private collections that have been donated to the local museum. Most open sites with cultural deposits have sustained damage due to collection and illegal excavation activities, as well as important cave deposits.

### 3.3 Economic Conditions

The AFO area encompasses portions of Modoc, Lassen, Shasta, and Siskiyou Counties. The alternative management plans could result in changes in countywide socioeconomic conditions and in fiscal impacts on county governments. Socioeconomic and fiscal conditions within the counties could change in response to changes in management emphasis or activities within the field office, such as changes in timber harvest, grazing, mineral extraction, and recreation.

Socioeconomic variables that could be affected by alternative management plans include population, employment, and income. Fiscal conditions include changes in county revenues attributable to changes in payment of in-lieu of taxes and federal revenue sharing from sale of timber, grazing fees, and mineral extraction, and sales taxes associated with increased recreation.

#### 3.3.1 Population

The 2000 population of Lassen, Modoc, Shasta, and Siskiyou Counties ranked 47th, 56th, 29th, and 44th respectively, among the 58 California counties. Between 1990 and 2000, population increased in Lassen, Shasta, and Siskiyou Counties by 23, 11, and 2%, respectively (Table 3.3-1). Population growth in Lassen County was higher than the 14% statewide average. The population level of Modoc County decreased by 2% during the same period.

In 2000, the population density of Modoc, Lassen, and Siskiyou Counties was 2.4, 7.4, and 7.0 persons per square mile, respectively. This is substantially less than the 43.1 persons per square mile in Shasta County. However, all four counties reflect population density less than the statewide average of 217.1 persons per square mile. (U.S. Bureau of the Census 2004a)

Projections indicate that the populations of Lassen, Shasta, and Siskiyou Counties are expected to continue to grow through 2020 (Table 3.3-2). Population within Shasta County is expected to grow at a higher rate than the statewide average, but growth in Lassen County is expected to be below the statewide rate. Population in Modoc County is expected to grow through 2010 and then decline slightly by 2020.

**Table 3.3-1** Population of California and Modoc, Lassen, Shasta, and Siskiyou Counties (1970–2000)

County	1970	1980		1990		2000	
	(Number)	(Number)	Change (%)	(Number)	Change (%)	(Number)	Change (%)
Lassen	14,690	21,661	+46	27,598	+27	33,828	+23
Modoc	7,469	8,610	+15	9,678	+12	9,449	-2
Shasta	77,640	115,715	+49	147,036	+27	163,256	+11
Siskiyou	33,225	39,732	+20	43,531	+10	44,301	+2
California	19,953,134	23,667,902	+19	29,760,021	+26	33,871,648	+14

Sources: U.S. Bureau of the Census 1995 and 2004a, n.

**Table 3.3-2** Population Projections and Percent Change for California and Lassen, Modoc, Shasta, and Siskiyou Counties (2000–2020)

County	2000	2010		2020	
	(Number)	(Number)	Change (%)	(Number)	Change (%)
Lassen	33,828	36,954	+9	38,232	+4
Modoc	9,449	9,547	+1	9,285	-3
Shasta	163,256	196,464	+20	227,922	+16
Siskiyou	44,301	45,611	+3	45,862	+1
California	33,871,648	39,246,767	+16	43,851,741	+12

Sources: U.S. Bureau of the Census 1995 and 2004a.

### 3.3.2 Employment and Income

Total employment in Lassen, Modoc, Shasta, and Siskiyou Counties in 2000 was 10,161, 3,635, 65,828, and 17,267, respectively (Table 3.3-3). The public administration, retail trade, and education, health, and social services sectors represented were the largest employment sectors in each county. Government employment accounted for 43, 33, 18, and 24% of total employment within Lassen, Modoc, and Shasta Counties, respectively.

Generally, the education, health and social services; arts, entertainment, and recreation; and public administration sectors experienced the greatest growth in employment. Conversely, employment in the agriculture, forestry, fishing, and mining; manufacturing; and retail trade sectors declined. Decreases in employment in these sectors most likely reflect declines in the forest products industry; and the increases in the other sectors reflect a shift to more service-oriented employment in the three counties—with the greatest shift occurring in Shasta County.

Unemployment rates for the three counties ranged from a high of 7% in Modoc County to a low of 4% in Lassen County (U.S. Census 2004c, 2004e, 2004g, and 2004i). The statewide unemployment rate was approximately 4% in 2000.

Per capita income for the three counties ranged from a high of approximately \$17,700 in Shasta County to \$14,700 in Lassen County (Table 3.3-4). Income levels have increased in each county from 1990 levels. Increases have ranged from a low of 17% in Lassen County to a high of 57% in Modoc County. Although income levels have increased in all four counties, they are still below the statewide average of \$22,711.

### 3.3.3 County Revenues

#### 3.3.3.1 Lassen County

During fiscal year 2000–2001, Lassen County received approximately \$43,434,000 in revenues (California State Controller 2003). Property taxes accounted for \$2.9 million of the 2000–2001 revenues. Sales taxes totaled approximately \$733,000, and lodging taxes totaled approximately \$43,000. Payments from other governmental agencies accounted for the largest share of county revenues. Payments from other state agencies and the federal government totaled approximately \$19.9 million and \$8 million, respectively (California State Controller 2003).

Lassen County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. The payments are based on population and acreage of federal lands within the county.

**Table 3.3-3** Employment Sectors for Lassen, Modoc, Shasta, and Siskiyou Counties (1990 and 2000)

Employment Sector	Lassen		Modoc		Shasta		Siskiyou	
	1990	2000	1990	2000	1990	2000	1990	2000
Agriculture, forestry, fishing, and mining	958	691	755	660	2,291	1,631	2,043	1,737
Construction	521	578	196	251	5,320	4,890	942	948
Manufacturing	726	342	273	135	6,438	4,199	2,272	1,111
Wholesale trade	207	129	90	129	1,907	1,984	326	379
Retail trade	1,423	1,117	626	343	11,835	9,309	2,996	2,200
Transportation and warehousing	519	326	208	212	4,513	3,730	1,188	982
Information	-	141	-	29	-	1,335	-	275
Finance, insurance, and real estate	246	303	166	79	3,398	3,408	797	653
Professional, scientific, and management	456	431	193	107	4,243	5,055	1,362	1,100
Education, health, and social services	1,352	2,329	543	925	10,250	16,291	2,498	4,017
Arts, entertainment, recreation, accommodation, and food services	111	700	34	200	688	6,258	210	1,767
Other services	999	339	224	198	9,283	3,952	971	900
Public administration	1,710	2,735	227	367	2,655	3,786	900	1,200
Total	9,228	10,161	3,535	3,635	58,578	65,828	16,505	17,269

Sources: U.S. Census 2004b–i.

**Table 3.3-4** Per Capita Income Levels for Lassen, Modoc, Shasta, and Siskiyou Counties and California (1990 and 2000)

County	1990	2000	Change (%)
Lassen	12,626	14,749	+17
Modoc	10,971	17,285	+57
Shasta	12,381	17,738	+43
Siskiyou	12,202	17,570	+42
California	16,409	22,711	+38

Source: U.S. Census 2004c, e–f, h, j–m.

Approximately 1,640,000 acres of land in Lassen County are under federal ownership, of which 1,009,000 acres are managed by BLM (BLM 2004a). During fiscal year 2000–2001, Lassen County received a \$996,000 in-lieu of taxes payment (BLM 2004b).

In-lieu of taxes payments from BLM lands was estimated to total approximately \$608,000 in 2001. In-lieu of taxes payments accounted for 1.4% of the county's total 2001 revenues. Lassen County also receives payments from the federal government in the form of revenue sharing.

Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within California totaled \$203,000 in 2002 (BLM 2002). The revenues paid to Lassen County are not a substantial portion of the total county revenues.

### **3.3.3.2 Modoc County**

During fiscal year 2000–2001, Modoc County received approximately \$24,421,000 in revenues (California State Controller 2003). Property taxes accounted for \$2.2 million of the 2000–2001 revenues. Sales taxes totaled approximately \$236,000, and transient lodging taxes totaled approximately \$20,000. Payments from other governmental agencies accounted for the largest share of county revenues. Payments from other state agencies and the federal government totaled approximately \$10.4 million and \$5.9 million, respectively (California State Controller 2003).

Modoc County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. The payments are based on population and acreage of federal lands within the county. Approximately 1,695,000 acres of land in Modoc County are under federal ownership, of which 272,400 are managed by BLM (BLM 2004a). During fiscal year 2000–2001, Modoc County received a \$259,000 in-lieu of taxes payment (BLM 2004b). In-lieu of taxes payments from BLM lands were estimated to total approximately \$42,000 in 2001. In-lieu of taxes payments accounted for less than 1% of the county's total 2001 revenues.

Modoc County also receives payments from the federal government in the form of revenue sharing. Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within California totaled \$203,000 in 2002 (BLM 2002). The revenues paid to Modoc County are not a substantial portion of the total county revenues.

### **3.3.3.3 Shasta County**

During fiscal year 2000–2001, Shasta County received approximately \$209,296,000 in revenues (California State Controller 2003). Property taxes accounted for \$12.7 million of the 2000–2001 revenues. Sales taxes totaled approximately \$6 million, and transient lodging taxes totaled approximately \$594,000. Payments from other governmental agencies accounted for the largest share of county revenues. Payments from other state agencies and the federal government totaled approximately \$104 million and \$51.4 million, respectively (California State Controller 2003).

Shasta County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. The payments are based on population and acreage of federal lands within the county. Approximately 981,000 acres of land in Shasta County are under federal ownership, of which 126,600 are managed by BLM (BLM 2004a). During fiscal year 2000–2001, Shasta County received a \$669,000 in-lieu of taxes payment (U.S. Bureau of Land Management 2004b). In-lieu of taxes payments from BLM lands was estimated to total approximately \$86,300 in 2001. In-lieu of taxes payments accounted for less than 1% of the county's total 2001 revenues.

Shasta County also receives payments from the federal government in the form of revenue sharing. Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within California totaled \$203,000 in 2002 (BLM 2002). The proportion of these revenues paid to Shasta County is not a substantial portion of total county revenues.

**3.3.3.4 Siskiyou County**

During fiscal year 2000-2001, Siskiyou County received approximately \$72,386,000 in revenues (California State Controller 2003). Property taxes accounted for \$7 million of the 2000–2001 revenues. Sales taxes totaled approximately \$740,000 million, and transient lodging taxes totaled approximately \$399,000. Payments from other governmental agencies accounted for the largest share of county revenues. Payments from other state agencies and the federal government totaled approximately \$31 million and \$21.7 million, respectively (California State Controller 2003).

Siskiyou County receives in-lieu of taxes payments from federal agencies that manage federal lands within the county. The payments are based on population and acreage of federal lands within the county. Approximately 2,563,800 acres of land in Siskiyou County are under federal ownership, of which 82,600 are managed by BLM (BLM 2004a). During fiscal year 2000–2001, Siskiyou County received a \$392,000 in-lieu of taxes payment (BLM 2004b). In-lieu of taxes payments from BLM lands was estimated to total approximately \$12,600 in 2001. In-lieu of taxes payments accounted for less than 1% of the county's total 2001 revenues.

Siskiyou County also receives payments from the federal government in the form of revenue sharing. Revenues generated from grazing fees, proceeds from land sales, timber receipts, and mineral royalties generated from all BLM lands within California totaled \$203,000 in 2002 (BLM 2002). The revenues paid to Shasta County are not a substantial portion of total county revenues.

## **3.4 Energy and Minerals**

The Federal Government's policy for mineral resource management, as expressed in the Mining and Minerals Policy Act of 1970, reads: "Foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security, and environmental needs." BLM has an essential role in contributing to an adequate and stable supply of mineral and energy resources, while continuing to sustain the land's productivity for other uses and its capability to support biodiversity goals.

The energy and minerals program on BLM-administered land in the AFO area includes three categories of minerals: leasable minerals, locatable minerals, and saleable minerals.

### **3.4.1 Leasable Minerals**

Leasable mineral resources, including oil, gas, geothermal, and some solid mineral resources such as coal and oil shale are obtained from the BLM-administered lands by leasing. The 1920 Mineral Leasing Act (as amended), the 1970 Geothermal Steam Act, and 43 Code of Federal Regulations (CFR) Parts 3100 and 3200 govern oil, gas, and geothermal leasing. These laws provide for the leasing of the public mineral estate by a prospector or a corporation, provided that the lands are open for mineral leasing and not reserved or withdrawn for other purposes. Site-specific stipulations are included in any oil and gas or geothermal EA prior to the issuance of any lease. Upon receipt of a plan of development, site-specific surveys must be completed to eliminate or mitigate any adverse impacts.

Although a number of oil and gas leases have been issued in the AFO area, no development or drilling has taken place on any of the previously issued leases. Lease applications were received in the Upper Pit River area in the early 1970s; however, no lease was issued or pursued further. Oil and gas leasing is not expected to increase unless unexpected technology advances reduce the risk of exploration beneath the existing volcanic cover.

An EA for potential geothermal leasing was completed in the Bieber area; however, no industry interest was generated. There was also interest in the Upper Pit River area for potential geothermal leasing, but industry interest was quite low. Existing hot springs along a trend southeast of the Glass Mountain Known Geothermal Resource Area toward the Ash Creek Wildlife Area suggests moderate to high geothermal potential. Under present and future energy needs and predicted government support, the known and potential geothermal resources are expected to spur future interest and activity in the AFO area.

### **3.4.2 Locatable Minerals**

Locatable minerals are minerals for which mining claims can be located, such as precious and base metals and some non-metallic minerals that are not classified as "common variety." Locatable minerals include rare and uncommon mineral types, such as gold, silver, copper, lead, and zinc, and some varieties of stone, pumice, and cinder deposits with distinct and special properties making them commercially valuable for use in manufacturing, industrial, or processing operations. In determining a deposit's commercial value, the following factors may be considered: quality and quantity of the deposit, geographic location, accessibility to transportation, and proximity to market or point of use. The General Mining Law of 1872 (as amended) provides the rights to prospect for valuable minerals, and to locate and develop mining claims on public domain lands open to mineral entry.

A mining claim is considered real property that is protected by constitutional rights. Active mining claims are limited to annual assessment and sporadic exploration activities, which are governed under the Mining Law of 1872. Notices and plans of operation for mining activities are processed according to regulations.

BLM administration of mining claims is covered under the 43 CFR 3809, Surface Management of Public Lands under U.S. Mining Laws. Prospectors can claim and develop locatable minerals on areas open to mineral location. BLM approval is not needed if proposed operations would disturb five acres or less per year, but notification is required. Operators proposing to disturb more than five acres per year are required to submit a plan of operation; BLM must then prepare an environmental analysis for the proposed action.

Present management direction with respect to locatable mineral development allows for exploration consistent with the protection of other resource values and encourages mineral exploration and development on all public lands, except those withdrawn through specific decisions for each sub-unit. Furthermore, where their development is consistent with other environmental and resource values, present management discourages closure of lands known or suspected to contain identified sub-economic minerals from exploration or location.

Potential locatable minerals in the AFO area include mercury, gold, silver, and zeolites. The now closed and reclaimed Hayden Hill surface gold mine was the major activity in the AFO area and included exploration, development, production, and reclamation. Exploration activity is expected to be minimal around the former mine site. The majority of BLM-administered lands under claim have been transferred to private ownership. Hayden Hill District is expected to remain active, with sporadic exploration activity probable, depending on gold prices.

Other locatable mineral activity is expected to be sporadic and primarily focused on areas of known mineral occurrences (i.e., existing claims). Activity would be oriented toward exploration and would fluctuate with the price of gold and other commodities. Technological breakthroughs and uses for rare minerals may spur speculative mineral exploration activities. Technological advances (geochemistry and geophysics) pertaining to exploration may lead to high-risk exploration activity under the unmineralized volcanics and Quaternary basins in the AFO area. The probability of another major mine is considered minimal; however, the potential impact of a mine on the AFO area would be large in terms of workloads, areas withdrawn from multiple use, and access.

### **3.4.3 Saleable Minerals**

Saleable minerals such as pumice, cinders, decorative stone, and sand and gravel may be purchased or acquired by use permits from BLM. The saleable minerals in the AFO area consist primarily of cinders and flat rock. Under field office policy, applicants are required to delineate the boundaries of proposed collection areas and the amount of mineral material to be collected. These proposed areas are then reviewed and adjusted by BLM staff. The applicant is then authorized to complete botanical and archaeological evaluations, as well as an environmental assessment (EA). After the evaluations and assessment are reviewed, and a collection permit may be issued. Collection season is limited to drier months to minimize impacts on soils. Trucks must be certified noxious weed free prior to entering public lands. Other site-specific stipulations apply.

Six cinder pits, generally no larger than five acres, are located in the AFO area. County and state road departments are the primary users of cinders. Leases for the six cinder pits are typically renewed to the county and private firms on a five-year permit. Occasional single sales to commercial contractors and private individuals are carried out in existing pits. Active mineral material operations are currently underway at Blue Sand and Brush Mountain Pits.

Pittville Silica #1 is currently leased but is not active. Although interest has been expressed in Muck Valley, Babcock, and Round Barn Pits, they are not active. Access into the Muck Valley Pit has been an issue. There has been no recent activity at Davis Creek, East Ash Valley, Moran, or Juniper Ridge Pits.

The Day Pit is closed due to noxious weed issues. Coyote Reservoir and Dixie Valley Pits also are closed. The Madeline Pit is managed by the California Department of Transportation.

Approximately 8,000 acres of flat rock occur in the AFO area. Such stone is used primarily in small commercial and residential construction industries. Long-term needs would be met from the existing resource base. Most areas of the field office are open to flat rock collection, except for The Ash Valley ACEC (1,322 acres) and the Cinder Cone Planning Area (approximately 50,000 acres), and wilderness study areas (WSAs) (56,648 acres). This Cinder Cone Planning Area acreage includes all areas of Shasta County administered by the AFO outside of existing WSAs. Under current management, authorized personal use of flat rock is not to exceed three tons per person per calendar year. Native Americans may be permitted to collect up to three tons per person per year from designated locations at no charge, for personal use in sweat lodges or for other ceremonial purposes.

Saleable mineral production is expected to increase as sources close to areas of growth face a stricter state and local regulatory environment. Sand and gravel demand is expected to increase because of the lower permitting fees and costs of materials on BLM-administered land, despite the added transportation costs. Demands for building stone are likely to increase dramatically as local sources are depleted, premium prices are paid in urban areas, and low fees are charged by BLM. Increased transportation costs likely would be offset by present and future demand and high profit margins.

### **3.4.4 Restrictions**

BLM-administered lands are generally open to mineral exploration and development under 43 CFR 3000-3800. Lands that are closed or withdrawn from some or all mining uses are known as “exclusion” areas. There are two types of closures to mineral leasing and mineral material disposal: discretionary and nondiscretionary. Discretionary closures are management-level decisions to close lands to mineral leasing and disposal; nondiscretionary closures are formal withdrawals by Congress or the Secretary of the Interior. Withdrawals of land from locatable mineral entry can occur only through nondiscretionary actions by Congress or the Secretary of the Interior.

Discretionary closures may apply in ACECs, research natural areas (RNAs), WSAs, and where mining is incompatible with other management objectives or land uses. Nondiscretionary closures occur in wilderness areas or areas withdrawn for other purposes. WSAs are nondiscretionally withdrawn from mineral leasing (43 CFR 3100.0-3 and 3201.11) but are open to locatable mineral entry, with restrictions to prevent impairment of the area’s suitability for inclusion in the wilderness system (43 CFR 3802.1-5). Except for pending decisions on the existing WSAs, ACECs, and special management areas and potential conditions applied to future (ongoing) acquisitions, there are no indications that future mineral withdrawals will occur in the lifetime of this Proposed Resource Management Plan (PRMP).

On lands open to mineral development and exploration, additional restrictions may apply to protect natural resources and mitigate conflicts with management objectives and other land uses. Such restrictions also would apply in “avoidance” areas, including ACECs, WSAs, and RNAs not listed as closed to mineral operations. Restrictions may also apply to protect visual resources, significant archeological sites, wildlife, and habitat components. All applicable restrictions would be attached to mining notices, plans of operations, leases, permits, and contracts.

Some areas are closed to surface occupancy (no surface occupancy) for fluid mineral leasing operations. Under this type of restriction, drilling to explore, test, or produce fluid mineral resources may not occur from the surface. Mineral leasing may still occur, provided that the operator angle drills to the resource from an adjacent area where surface occupancy is allowed.

### **3.4.5 Factors Affecting Future Development**

Energy and mineral resource use has been relatively stable during implementation of the existing management framework plans.

Key factors affecting future resource and use conditions include:

- Mineral and energy commodity prices.
- Technological advances in the use of common and rare elements.
- Technological advances in exploration techniques.
- Energy demands and changing dependencies on fossil fuels.
- Legislative and regulatory changes that support or oppose energy and minerals activities.
- Acceptance of existing or future WSAs as wilderness areas.
- Continued stringent regulations at the state and local levels, pushing mineral extraction activities into more remote (federal) locations in response to increased demand.
- Changes in the California Department of Transportation's budget that influence sand and gravel usage. Major projects in the AFO area have been postponed as projects in the southern part of the state have taken priority.

## **3.5 Environmental Justice**

The Alturas resource management planning process incorporates environmental justice considerations. In doing so, the planning process addresses any adverse human health or environmental impacts affecting minority and low-income populations to a greater extent than the general population in these areas.

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from the execution of federal, state, local, or tribal programs and policies.

Meaningful involvement means that (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health, (2) the public's contribution can influence the regulatory agency's decision, (3) concerns of all participants involved will be considered in the decision making process, and (4) decision makers must seek out and facilitate the involvement of those potentially affected.

### **3.5.1 Minority Populations in the Alturas Field Office Area**

For environmental justice assessment purposes, key minority populations are those where either: (1) the minority population of the affected area exceeds 50%, or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

The AFO planning area is composed of Lassen, Modoc, Shasta and Siskiyou Counties in California. The minority population breakdown by county and state is contained in Table 3.5-1.

Several tribal governments have lands or interests within the AFO boundaries. Among these are the Pit River Tribe, the Klamath Tribes, and the Alturas, Likely, Lookout and Redding Rancherías. The field office has also consulted with the Shasta Tribe concerning management activities (Burke, personal communication).

### **3.5.2 Low-Income Populations in the Alturas Field Office Area**

To determine the location of low-income populations, economic characteristics of the counties in the field office area were analyzed (Table 3.5-2). The U.S. Bureau of the Census sets the income threshold to determine poverty level. If the total income for an individual falls below the relevant poverty threshold, that individual is classified as being "below the poverty level" (U.S. Census Bureau 2003b). In the state of California, 10.6% of the total population was below the poverty level in 2000 (U.S. Census Bureau 2003c). All identified income levels (median household, family, and per capita) for all the counties in the field office area fall below the statewide averages. In addition, a higher percentage of families in the field office area are living below the poverty level than the statewide average. Especially high in the AFO area, 32.2% of the population in Shasta County was below the poverty level in 2000; the State average was 10.6% of the total population in California for that year.

**Table 3.5-1** Population Characteristics of Lassen, Modoc, Shasta, and Siskiyou Counties (2000)

Geographic Area (Total Population)	White	Hispanic or Latino (any race)	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race
Lassen County (33,828)	83.3% (28,169)	13.8% (4,681)	9.1% (3,081)	4.6% (1,572)	1.1% (382)	0.6% (194)	4.1% (1,402)
Modoc County (9,449)	88.6% (8,374)	11.5% (1,088)	1.0% (90)	5.8% (552)	1.0% (93)	0.2% (17)	6.4% (607)
Shasta County (163,256)	92.5% (151,083)	5.5% (8,998)	1.1% (1,818)	4.8% (7,829)	2.4% (3,938)	0.3% (451)	2.5% (4,125)
Siskiyou County (44,301)	90.5% (40,074)	7.6% (3,354)	1.6% (726)	6.2% (2,747)	1.6% (701)	0.3% (130)	3.7% (1,632)
Alturas Field Office area	90.7%	7.0%	2.0%	5.0%	2.0%	0.3%	3.1%
State of California (33,871,648)	59.5%	32.4%	6.7%	1.0%	10.9%	0.3%	16.8%

Notes:

The AFO area numbers were extrapolated by combining the data available for all counties in the planning area.

Race is typically broken out two ways. The Hispanic information is typically separate because Hispanics can be of any race. The Hispanic information is presented in combination with the other racial information in the table above.

Source: U.S. Census Bureau, Census 2000, DP-1 Profile of General Population Characteristics: 2000, (List Counties) California.

California information was accessed from the same source: [http://factfinder.census.gov/servlet/QTTable?\\_ts=88407310470](http://factfinder.census.gov/servlet/QTTable?_ts=88407310470).

**Table 3.5-2** Economic Characteristics of Lassen, Modoc, Shasta, and Siskiyou Counties (2000)

County	Median Household Income	Median Family Income	Per Capita Income	% of Families below Poverty Level
Lassen	\$36,310	\$43,398	\$14,749	11.1
Modoc	\$27,522	\$35,978	\$17,285	16.4
Shasta	\$34,335	\$40,491	\$17,738	32.2
Siskiyou	\$29,530	\$36,890	\$17,570	14.0
Statewide	\$47,493	\$53,025	\$22,711	10.6

Source: U.S. Census Bureau, DP-3, Profile of Selected Economic Characteristics: 2000, (All Counties) California. State information was accessed from the same source: [http://factfinder.census.gov/servlet/QTTable?\\_ts=88407972930](http://factfinder.census.gov/servlet/QTTable?_ts=88407972930).

### 3.5.3 Tribal Governments in the Alturas Field Office Area

Three federally recognized tribal governments are located in the AFO area: the Pit River Tribal Council (Burney, Shasta County, CA), the Klamath Tribes (headquartered in Oregon), and the Alturas Rancheria (Alturas, Modoc County, CA) (Burke, personal communication). Tribal land ownership accounts for less than 1% of the land in the AFO area (12,493 acres of 4,117,341 total acres).

## 3.6 Fire and Fuels

Fire and fuels on lands administered by the AFO have been affected by active and passive management actions since prehistoric times. Vegetation and fuel type are two primary descriptors of fire and fuel resources. Fuel in the natural environment includes both live vegetation and materials such as dead branches, needles, seeds, and cones. These fuels provide the structure that, under appropriate conditions, supports fire across the landscape. The vegetation and fuel are affected by other elements of the environment, such as precipitation, temperature, soils, and seasonal fluctuations.



### 3.6.1 Fuels Buildup and Ecosystem Alteration

When trying to determine the effects of post-European human influence and management on the fire and fuels resource, the characterization of the fire regime condition class is an important index. A historical fire regime is defined by the natural patterns of frequency, predictability, seasonality, intensity, duration, and scale with which fire historically passed through the habitat

Fire regimes have been generally classified into the five groups that are summarized in Table 3.6-1.

**Table 3.6-1** Fire Regime Condition Classes

Classification	Fire Return Interval	Severity	Example Habitats
Group I	0–35 years	Low	Ponderosa pine, other long-needle pine species, and dry-site Douglas-fir
Group II	0–35 years	Stand replacement	Drier grasslands, tall grass prairie, and some Pacific chaparral ecosystems
Group III	35–100+ years	Mixed	Interior dry-site shrub communities, such as sagebrush and chaparral ecosystems
Group IV	35–100+ years	Stand replacement	Lodgepole pine and jack pine
Group V	>200 years	Stand replacement	Temperate rain forest, boreal forest, and high-elevation conifer species

Sources: Hardy et al. 2001, Schmidt et al. 2002.

A corollary descriptor of fuel conditions addresses a fire regime's degree of deviation from historic conditions. The condition classes described below also measure general wildfire ecosystem risk.

- **Condition Class 1:** Fire regimes in this condition class are mostly within historical ranges. Vegetation composition and structure are intact. The risk of losing key components of the ecosystem from fire is low.
- **Condition Class 2:** Fire regimes in this condition class have been moderately altered from their historical range, either by increasing or decreasing the fire frequency. The risk of losing key components of the ecosystem from fire is moderate.

- **Condition Class 3:** Fire regimes in this condition class have been significantly altered from their historical return intervals. Vegetation composition, structure, and diversity have been substantially modified. The risk of losing key components of the ecosystem from fire is high. (Hardy et al. 2001, Schmidt et al. 2002).

The concepts of fire regime and condition class require an understanding of historical (pre-European) conditions to facilitate measurement of the departure from those conditions. For areas where pre-European vegetation maps are not available, one method to determine historical vegetation is to use information on soils, climate, and topography of the area to predict the potential natural vegetation (PNV). PNV groups represent the stable vegetation types that would become established on an ecological site if all successional stages were completed without human interference under present environmental conditions.

Although methodologies exist to arrive at PNV groups, these have not been determined for the AFO area at a useful scale. Therefore, the conditions of the various vegetation communities listed below are based on current vegetation and extrapolated information from personal observation and historical photos.

An important factor to describe conditions is the fuel loading and fuel model. This measurement takes into account the variety of available fuels within given fuel types. For example, forest stands may be very clean and open with little down material or could have decades of dead branches and a thick understory of smaller trees. Such diverse conditions would indicate different fire behavior and characteristics.

### 3.6.2 Fire Ecology of Major Vegetation Types

#### ***Aspen/Riparian Communities***

Fire is not usually considered a key ecosystem component in these areas, although many riparian and wetland plants are fire-adapted species. These communities are usually small (but vital) habitat components of the vegetation communities discussed below. Generally, vegetation response to the presence of water or increased soil moisture creates conditions that act to inhibit the spread or reduce the severity of fire. Across the landscape, riparian communities often create breaks in fire spread. In some riparian systems, fire suppression has created fuel loads that exceed the surrounding habitat and consequently put the riparian area at higher risk than the surrounding community. Fire can act as the disturbance agent within aspen stands; some level of disturbance is an important component of aspen regeneration. Fire also reduces the encroachment of conifers, which over time can replace aspen stands. The fire regime of aspen/riparian communities is considered to be Group III with regard to frequency and severity. Fire managers do not give these communities a specific condition class rating, but they must be considered when looking at the larger vegetation type or hydrologic unit.

#### ***Herbaceous and Grassland Communities***

A fire in these communities burns quickly and with a low intensity. The historical fire regime for these communities is Group II—frequent stand-replacing fires. The invasion of nonnative annual grasses has accelerated this cycle, creating communities that could burn every season. Native species typically burn but then experience several years of fire resistance because of high live-fuel moisture, lack of fuel continuity, and very small amounts of dead material. As these components change over time, the community becomes more fire-prone. A fire occurring too early in this cycle can be damaging to the native grasses.

Due to the expanse of exotic annual grasses in the AFO area, native herbaceous and grassland communities are at great risk of conversion to these exotic annual grass species. These exotic species have the ability to rapidly expand and colonize large areas following disturbance (e.g., wildfire); consequently, areas that have undergone such conversion are rated as Condition Class 3.

### ***Low Sagebrush Communities***

In low sagebrush communities, natural fire return intervals are historically 100 years or more, due to the shallow, rocky soils and sparse ground fuels. Because there is a lack of surface fuel continuity, fires tend to burn in a mosaic pattern with mixed severity, a fire regime characterized as Group III. Exceptions are where exotic annuals have invaded or where an unusually wet spring provides an above-normal crop of grasses and forbs sufficient to carry fire through the site.

Within the AFO area, a few low sagebrush communities could be considered to function within historical fire return intervals, and pose little risk of major disturbance or invasion by exotic grasses and weeds. These areas could be rated as Condition Class 1. (It should be noted that these types of low-risk areas are probably among the best locations for wildland fire use in future planning efforts.)

Other low sagebrush communities have been, or are at risk of being, invaded by exotic grasses. Like Wyoming sagebrush sites, some of these sites have experienced dramatically altered (i.e., shortened) fire return intervals to the point that the low sage component of the community has been virtually eliminated. These sites are considered Condition Class 3.

### ***Conifer/Juniper Woodlands***

Within the AFO area, there are stands of pine, fir, and/or cedar. These stands most typically occur on the Lassen and Modoc National Forests; however, this type also occurs on BLM-administered lands, particularly in the Fall River/Big Valley watershed. Many of these stands are located on boundaries between BLM land and National Forest system or private timber lands. Historically, many of these conifer communities experienced frequent low-intensity fire (fire regime Group I) or less frequent stand-replacing fire (fire regime Group IV). Because these areas have generally missed several fire return intervals and a wildfire probably would result in severe fire effects on major species, the areas are rated as Condition Class 3.

Juniper is a complex management issue for BLM. The species is widely scattered throughout the field office area. Most juniper issues involve either stand density or encroachment into adjacent habitats. The historical coverage and conditions of juniper in the field office area are unknown.

Prior to fire suppression and grazing, juniper probably occurred in two main stand types. One was an old growth stand condition with very infrequent, stand-replacing fires (fire regime Group IV); these stands would have occurred on rocky, shallow soils with limited accumulation of fine fuels.

Another stand type was juniper savanna, with younger trees at a low density (<30% crown closure) across the landscape and a more dominant shrub, herbaceous, and grass understory; these stands would have occurred on deeper soils and experienced more frequent mixed-severity fires (fire regime Group III). A continuum of stand types would have existed along with the various seral stages; however, these two stand conditions probably dominated. During the last 130 years, within the Intermountain West, juniper has increased its distribution and density (Miller and Tausch 2001).

On many sites that would have supported low-density juniper woodland, juniper has expanded to greater than 30% crown closure. This is considered a successional phase that, under pre-settlement conditions, would not have occurred or would occur very rarely.

In these areas, understory vegetation declines to the point where little if any surface vegetation is left, and there are substantial areas of bare ground. These sites have missed several fire return intervals and are losing key ecosystem components. A wildland fire in these sites could result in further degradation of the system and negatively affect soils. Therefore, these sites are rated as Condition Class 3.

Juniper with less than 30% crown closure is often found associated with other communities, such as mountain big sagebrush. Depending on influencing factors (especially soil characteristics), such sites might reflect historical conditions, in which case the community would be considered Condition Class 1. However, such sites can also reflect sagebrush vegetation into which juniper has encroached. In this situation, one or several fire return intervals have been missed. Wildland fires in such areas can result in both positive and negative effects; such areas are rated as Condition Class 2. These successional sites can also develop into Condition Class 3.

### ***Oak Woodland/Gray Pine/Ceanothus Communities***

The majority of this community type is only present in the western portion of the AFO area, in the Fall River/Big Valley watershed. Fires within this community are typically stand-replacing events with short to longer return intervals (fire regime Groups II and IV). Many of these communities have been altered through fire exclusion, grazing, and other management practices, and are considered Condition Classes 2 and 3. Several of the communities at risk and wildland urban interface (WUI) areas are within this community type (see the discussion of “Wildland Urban Interface” later in this section).

### ***Basin/Wyoming Big Sagebrush Communities***

BLM fire managers agree that these are probably the sites most at risk in lands in the eastern portion of the field office. This is also the vegetation type that has been, or is at risk of being, invaded by exotic annuals such as cheatgrass and medusahead. At some sites, sagebrush has been nearly eliminated and exotic grasses dominate.

Historically, fire return intervals for Wyoming big sagebrush communities were from 50 to 100 years, corresponding to fire regime Group IV (Miller et al. 2001); but there is still much debate over fire return intervals in the Basin big sagebrush types (Welch and Criddle 2003). Invasion by flammable exotics has dramatically shortened fire return intervals, in some cases to 1–2 years. This can lead to complete conversion of sites from Wyoming big sagebrush communities to annual grasslands. Consequently, these communities are rated as Condition Class 3.

### ***Mixed Desert and Basin Shrub Communities***

These communities are probably fire regime Group IV. In most watersheds, these communities have missed one or more fire return intervals, and some are at risk of invasion of exotic weeds and grasses following a wildfire that could easily result in a type conversion to these annual exotics. Where one or more fire return intervals have been missed, the community is at greater risk of loss from invasion by annual exotic grass and weed species following a disturbance. Accordingly, such areas are rated Condition Class 3.

In some areas, this community has not missed a fire return interval or been invaded by exotic grasses. These areas would likely be in good ecological condition and would be rated as Condition Class 1.

### ***Mountain Big Sagebrush Communities***

Historically, this community type would have burned with moderate frequency and mixed severity (fire regime Group III). In most watersheds, these communities have missed one or more fire return intervals. Some are at risk of invasion of exotic weeds and grasses following a wildfire, which could easily result in a type conversion to these annual exotics. Many of the current juniper stands may have become established recently in historical mountain big sagebrush communities. Due to the expanse of juniper and exotic grasses, this plant community is at great risk of loss and consequently has been rated as Condition Class 3. Wildland fires can result in both positive and negative effects in terms of plant and wildlife species. Important species in this community are aspen, mountain brush species, and curleaf mountain mahogany.

### **3.6.3 Fire History**

Fire frequency and type (lightning or human caused), as well as past fire sizes and locations on the landscape, are important for assessing effects and effectiveness of past management and for identifying appropriate future management.

Most wildland fires in the AFO area are ignited by lightning. An average of 26 fires has occurred annually over the last 20 years on BLM-administered lands in the field office area. Of these, 21 (81%) were caused by lightning and 5 (19%) were human-caused. This record has implications for both the timing and location of fire occurrences. Lightning ignitions generally occur from June to early September and can occur in more remote locations where access is difficult. Lightning storms are often accompanied by little or no rainfall. In these events, wildland fires can spread quickly and cover large areas, burning hundreds or thousands of acres in a single burning period. Wet lightning storms can produce several fires, but these are often much smaller. Human-caused fires tend to occur in areas that are accessible for fire suppression but can occur during periods of extreme fire conditions.

Over the last 24 years, the number of fires larger than 100 acres has varied substantially—from 1 to 12 per year (Table 3.6-2), depending on many weather-related variables and, to a lesser extent, the availability of fire suppression resources. An average of 7,800 acres per year, or less than 0.2% of the entire 4,117,341-acre field office area, burns annually as a result of larger fires. Most fires are small. Of the 519 fires on BLM-administered lands within the last 20 years in the AFO area, over 90% have been controlled after burning less than 10 acres.

### **3.6.4 Fire Management**

Fire suppression involves using resources (e.g., aircraft, engines, and crews) to contain and control fires. The costs associated with suppression are determined by the type of resources used and the length of time they are attached to a given incident.

#### ***Direct Protection Areas***

The State of California and major federal land management agencies entered into a wildland fire protection agreement several years ago to improve interagency cooperation, achieve objectives common to all agencies, provide a functionally integrated fire protection system, share fire resources, and make the best use of tax dollars.

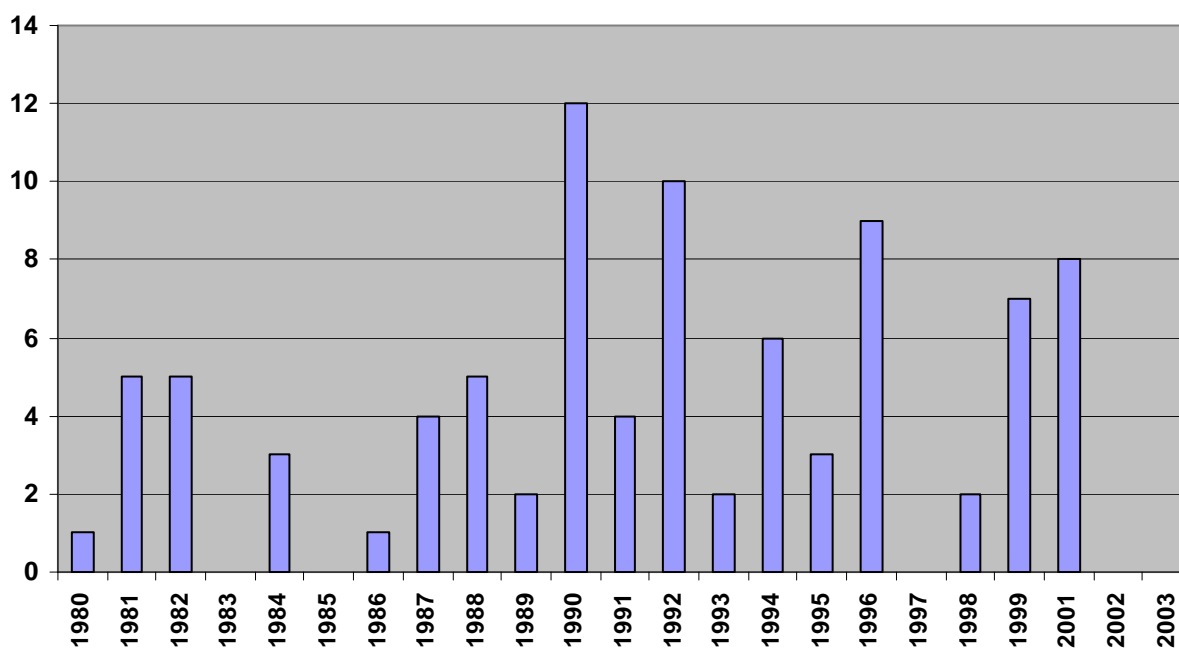
In California, State Responsibility Areas (SRAs) are lands for which the state is responsible for wildland fire protection under California Public Resource Code Sections 4125 to 4127. These lands are often referred to as state and private lands.

National Forest lands for which the U.S. Department of Agriculture (USDA) Forest Service is responsible, National Park lands for which the National Park Service is responsible, and public lands for which BLM is responsible, are referred to as federal responsibility areas (FRAs). These SRA and FRA lands are often intermingled or adjacent, and wildland fires on one type present a threat to the lands on the other.

To help resolve the management and fiscal complexities of wildland fires burning across intermingled and adjacent SRA and FRA lands, the federal and state fire protection agencies have developed the concept of direct protection areas (DPAs). Within these DPAs, federal and state agencies assume fire protection responsibility for the lands of another agency, along with their own. The agencies also, as nearly as possible, represent the other agencies interests and objectives. Consequently, each agency must possess the recognition, knowledge, and understanding of each other's mission objectives, policies, and authorities.

DPAs have delineated boundaries, or dividing lines, between lands that will be provided wildland fire protection by state or federal agencies, regardless of ownership within those areas. DPA boundaries are established by mutual consent between federal and state agencies. Existing protection organizations and facilities, response times, land ownership patterns, values to be protected, and pertinent statutes and regulations are considered when determining the location of the DPA boundaries. Boundaries often follow easily definable features, such as highways, roads, rivers, or well-defined ownership lines. DPA boundaries can be reevaluated. When the need for a change is identified, the affected BLM units and offices recommend the change to state-level administrators/directors for approval.

**Table 3.6-2** Annual Number of Large Fires (> 100 Acres) in the AFO Area (1980–2003)



## ***Suppression Strategies***

### ***Full Suppression***

Full suppression is a response where wildland fire ignitions are aggressively fought with the least cost and least acres burned philosophy, using a full array of management actions available unless site-specific restrictions apply (e.g., WSAs and ACECs). Firefighter and public safety is the number one priority. Under this strategy, a fire that is achieving resource objectives (i.e., reducing fuels or restoring fire-dependent ecosystems) and is not causing resource damages or threatening public health or safety would still be required to be aggressively suppressed.

### ***Appropriate Management Response***

An appropriate management response (AMR) on wildland fires emphasizes firefighter and public safety; however, fires are prioritized based on values to be protected commensurate with cost.

Allocations designated for AMR will receive a suppression response in the event of a wildfire ignition, but “The response to a wildland fire is based on an evaluation of risks to firefighter and public safety, the circumstances under which the fire occurs, including weather and fuel conditions, natural and cultural resource management objectives, protection priorities, and values to be protected. The evaluation must also include an analysis of the context of the specific fire within the overall local, geographic area, or national wildland fire situation.” (Review and Update of the 1995 Federal Wildland Fire Management policy, January 2001, page 35).

AMR is formulated by risk assessment, objectives, environmental and fuel conditions, and other constraints. Suppression objectives are based on the maximum allowable acres per ignition (at various fire intensity levels). Critical suppression areas, such as wildland-urban interface, recreation sites, critical habitat, cultural sites, unstable soils, and ACECs are predetermined and full suppression constraints are used in these areas. An AMR could include aggressive suppression on one portion of a wildland fire while monitoring another portion of the same fire. Another AMR could be simply monitoring a wildland fire.

### ***Wildland Fire Use***

Wildland fire use (WFU) is not technically a suppression strategy; a naturally ignited fire is used to achieve specific resource goals for designated areas. WFU areas are pre-identified areas where wildland fire will be used to protect, maintain, and enhance resources and—as nearly as possible—be allowed to function in its natural ecological role. Use of fire is based on the approved Fire Management Plan and follows specific prescriptions contained in operational plans. Areas designated as a WFU area are expected to have a wider range of conditions that would still result in a non-resource damaging fire. These areas typically have missed fewer fire return intervals and therefore have less of a fuel buildup and have not been substantially altered ecologically.

## **3.6.5 Post-Fire Restoration**

The Burned Area Emergency Stabilization and Rehabilitation Handbook (H-1742-1) (BLM 2006) outlines the process for planning and implementing emergency, stabilization and rehabilitation (ES&R) projects following wildland fires and WFU. The Handbook is tiered to the Department of the Interior (DOI) Departmental Manual 620 DM.3 Wildland Fire Management Burned Area Emergency Stabilization and Rehabilitation

ES&R funds may be used to:

- Protect life, property, soil, water, and vegetation resources;
- Prevent unacceptable onsite or offsite damage by conducting assessments, and stabilizing soil and other critical resources;
- Facilitate meeting land use plan objectives and other federal laws; and
- Reduce the invasion and establishment of undesirable or invasive vegetation species through seeding or integrated pest management techniques.

As a part of the management of wildland fire incidents, the Field Office Manager, in cooperation with the fire management team and field office fire management officer develops and implements burned area ES&R. The BLM ES&R policy, found in the DOI Departmental Manual, 620 DM 3, Burned Area Emergency Stabilization and Rehabilitation (2004); Interagency Burned Area Rehabilitation Guidebook, Version 1.3, November 2006; Interagency Burned Area Emergency Response Guidebook, Version 4.0, February 2006; and BLM Handbook H-1742-1, Burned Area Emergency Stabilization and Rehabilitation, DOI, BLM, 2006 outlines procedures for writing and implementing Emergency Stabilization (ES) and Rehabilitation (R) Plans. The ES&R Plans are separate documents. See Chapter 2, Fire Rehabilitation and Stabilization.

Emergency stabilization (such as seeding to prevent erosion or the establishment of invasive plants) are actions taken within 1 year of a wildland fire to stabilize the site, prevent unacceptable degradation to natural and cultural resources, and minimize threats to life or property resulting from wildland fire.

Rehabilitation (tree planting, invasive plant treatments, fence replacement) includes actions taken within 3 years of a wildland fire to repair or improve lands unlikely to recover from wildland fire, or to repair or replace minor facilities damaged by fire.

### 3.6.6 Wildland Urban Interface

Another factor to be considered during fire management decisions is the location of human populations, the wildland urban interface (WUI). Most of the human development in the field office area consists of scattered homes, ranches, and their associated outbuildings. None of these would be defined as a community or considered a WUI. Nevertheless, these areas may still be at risk during wildfire events, and they consequently influence fire and fuels management.

Several exceptions to the above description are present in the AFO area. Several “communities at risk” are listed in the federal registry: Fall River Mills, MacArthur, Day, Pittville, Little Valley, and Bieber. These all are within the Fall River/Big Valley watershed. This area has seen a large increase in the WUI as a result of newer developments. Fuel breaks and prescribed burns have been conducted in this area to mitigate the fire risk, and future projects are planned. Firesafe councils have been used by residents as an educational and informational tool, showing how to protect their homes and community from wildfire.

Within the North Fork/South Fork watershed, the WUI exists as small communities (e.g., Likely, Alturas, and Canby) and scattered residences and ranches. Limited development has occurred in the last 20 years, with an increase in the last few years. WUI issues exist around many of these scattered residences and ranches in terms of defensible space, hazardous fuel buildup, hazardous materials, ignition risk, and public education.

### 3.7 Forestry

Forest resources in the AFO area consist of forestlands and woodlands. Forestlands are areas that are now, or in the future would be, capable of obtaining at least a 10% canopy cover of forest trees and are not currently developed for non-timber use. In northeastern California, these commercial species include Jeffrey pine, ponderosa pine, sugar pine, Douglas fir, white fir, and incense cedar. Woodlands are areas with at least 6% canopy cover and forested primarily with juniper, oak, aspen, mountain mahogany, and other non-commercial species.



Forestland is subdivided into commercial forestland capable of producing  $\geq 20$  cubic feet per acre per year of commercial species and low-site forestland producing  $< 20$  cubic feet per acre per year of commercial species. Low-site forests generally occur where commercial forestland grades into juniper woodland. These forests are composed of scattered ponderosa pine, Jeffrey pine, western juniper, and occasionally oak.

There are approximately 4,764 acres of forestland and 213,182 acres of woodland and low-site forestland in the AFO area. Acreage in each watershed in the field office area is shown in Table 3.7-1.

**Table 3.7-1** Forestland and Woodland Area by Watershed in the Alturas Field Office Area (acres)

Watershed	Commercial Forestland	Woodland and Low Site Forestland
Fall River/Big Valley	180	27,966
Goose Lake	0	215
Madeline Plains	1,020	47,326
North Fork/South Fork	162	64,535
Tulelake	~100	23,663
Warm Springs	3,302	49,477
Total	4,764	213,182

Forestland owned and administered by BLM constitutes a small fraction of the AFO area. The majority of forested land (i.e., forestland and woodland) in the field office area is on the Modoc National Forest, with Shasta-Trinity, Klamath, and Lassen National Forests supporting lesser amounts in descending order. The timber harvest and value for the counties in the field office area (Lassen, Modoc, Shasta, and Siskiyou) ranged between 29.1 and 187.2 million board feet (MMBF) and \$4.3–40.5 million dollars per county in 2002 (California Board of Equalization 2002). By comparison, combined timber sales from the Alturas and Eagle Lake Field Office areas averaged 1.9 MMBF per year during the same time period (BLM file data).

Forestland in the AFO area consists of approximately two-thirds Jeffrey and ponderosa pine and approximately one-third white fir. Sugar pine, incense cedar, and Douglas-fir are also present. Stands are multi-aged, although there is a large component of even-aged trees in most stands. Many stands originated after logging and fires in the late 1800s and early 1900s.

Areas that burned subsequently in the 1900s have been planted to ponderosa and Jeffrey pine; such areas now support even-aged stands. In the Warm Springs watershed, approximately 2,000 of the 3,302 acres of forestland there are plantations that originated in the mid 1960s.

From the origin of BLM in 1946 through the 1960s, logging activities were concentrated on selective removal of high-risk old growth trees. High risk was defined as trees likely to die within 20 years. These old growth trees were 200–400 years old and older.

During the 1940s through the 1960s, approximately one-half of the old growth trees were selectively harvested. From the late 1970s through 1993, timber operations entailed some old growth harvest and a considerable amount of commercial thinning, which concentrated on harvesting trees that had reached economic maturity (trees approximately 120 years old and 21 inches diameter at breast height [DBH]). Since 1993, the driving force for timber removal in the field office area has been salvage logging following fire and in the presence of insect infestations (primarily white fir engraver and pine beetles) and disease (dwarf mistletoe).

Recent thinning and salvage operations have created stands that are relatively resistant to insect attacks; however, hazardous fuels in the form of overstocked stands, needles, slash from previous logging operations, and bitterbrush and other shrubs remain a concern. Stands in the field office area have not been surveyed and rated for hazardous fuel loads.

Forestlands and woodlands are used for log, pulpwood, and biomass chip production; recreation; hunting; gathering fuel wood; scientific research; and wildling collection (e.g., mushrooms, juniper berries, evergreen boughs, pinecones, and lichen).

The productive timberland is part of the Sustained Yield Unit (SYU) 15 base and is managed for timber production, with multiple use and threatened and endangered species constraints. SYU 15 includes BLM-administered lands in the Redding, Alturas, Surprise, Eagle Lake, Folsom, Bishop, and Bakersfield Field Office areas. Timber management in SYU 15 promotes pre-commercial thinning, site preparation, and planting to maximize production on forestlands. The annual allowable cut for the unit is 11.9 MMBF. Logs, pulpwood, and biomass are harvested.

The woodlands and low-site forestlands are not included in the SYU 15 allowable cut and are managed for removal or fuel wood and log or biomass harvest. Prescribed fire in juniper woodland is used for fuels reduction and to improve forage (see “Fire and Fuels”). In the Tulelake watershed, the majority of the productive forestland is on Mount Dome, which has been managed as a wildlife area (a bald eagle roosting area) with no harvest activities.

Wildfire, blowdown, insects, and disease affect the condition of forestlands and woodlands. Commercial and sanitation thinning to minimize impacts of insects, disease and wildfire have been practiced throughout the field office area. In cases where substantial damage to the resource has occurred (e.g., due to outbreaks of the fir engraver in the mid 1990s), salvage logging and woodcutting have been encouraged. Consequently, such areas are no longer overstocked and are therefore resistant to insect attack. Although stands in the field office area have not been assessed with respect to fuel loading, most stands—including plantations—present a hazardous fuels condition or fire hazard.

### 3.8 Lands and Realty

The AFO administers approximately 503,045 acres of land in Modoc, Lassen, Shasta, and Siskiyou Counties (Table 3.8-1). The AFO area includes several large contiguous blocks of public land, such as on the Likely Tablelands, Tule Mountain, and the Silva Flat area. Much of the remaining public land is located in smaller, scattered parcels.



**Table 3.8-1** Land Ownership in the Alturas Field Office Area

Ownership	Acres
U.S. Bureau of Land Management, AFO	503,045
U.S. Department of Agriculture Forest Service	1,914,803
U.S. Bureau of Reclamation	8,223
Indian land	12,493
National Park Service	46,566
U.S. Fish and Wildlife Service	103,416
State	14,919
Private	1,513,876
Total	4,117,341

The Land Tenure Adjustment Plan (LTAP) amendment identifies broad areas of BLM-administered lands for retention and intensive management in accordance with the resource management goals and objectives (see Appendix L; Map LAND-1). These areas are referred to as retention/acquisition areas and encompass the majority of the field office area. Within these areas, BLM would work with willing private landowners to complete land exchanges that would provide public land management benefits as well as management benefits for the private landowners. The retention/acquisition areas, where BLM wishes to acquire private land by exchange, are generally larger expanses of public lands with smaller private inholdings. These retention/acquisition areas are places where BLM intends to focus on long-term management of public lands in accordance with identified goals, values, and objectives.

#### 3.8.1 Retention/Acquisition Areas

The LTAP amendment identifies broad areas of BLM-administered lands for retention and intensive management in accordance with the resource management goals and objectives of the plan (Map LAND-1). These areas are referred to as retention/acquisition areas. Within these areas, BLM would work with willing private landowners to complete land exchanges that would provide public land management benefits as well as management benefits for the private landowners. The retention/acquisition areas where BLM wishes to acquire private land by exchange are generally larger expanses of public lands with smaller private inholdings. These retention/acquisition areas are places where BLM intends to focus on long-term management of public lands in accordance with the goals, values, and objectives identified in this PRMP.

As described above, retention areas are generally larger expanses of BLM-administered lands with smaller private inholdings, or areas with special management considerations or significant resources. They are often portions of, and in some cases, all of specific existing management areas. Areas where BLM-administered lands would be retained include WSAs, ACECs/RNAs, rights-of-way (ROWs), and other special management areas.

The Alturas management area encompasses four WSAs, including:

- Lava, 10,770 acres
- Pit River Canyon, 10,984 acres
- Timbered Crater, 17,896 acres and
- Tule Mountain, 16,998 acres

Lands within the AFO WSAs would continue to be retained and managed as wilderness until a final decision by Congress. Other lands within the field office may be retained as custodial lands for resource values, including lands currently identified for disposal—should environmental review prior to disposal reveal any significant resource values that would warrant retention.

### 3.8.2 Disposal Areas

The LTAP amendment identifies broad areas of public lands where BLM generally intends to dispose of existing BLM-administered lands, either by land exchange or sale (Map LAND-1). These areas are referred to as disposal areas, and they represent areas where BLM would not seek to acquire any private lands by land exchanges or other methods. Within these disposal areas may be some specific parcels of BLM-administered land that BLM intends to retain in public ownership for a variety of resource management reasons. These BLM-administered land parcels would be in a custodial category within which BLM would continue to manage them for existing resource values. The BLM-administered lands to be exchanged or sold into private ownership in the disposal areas are generally smaller, scattered, isolated parcels surrounded by private land in areas where BLM does not generally intend to focus on long-term continued management.

Approximate acreage available for disposal in each County is as follows:

- Lassen 6,870 acres
- Modoc 9,980 acres
- Shasta 0 acres
- Siskiyou 1,720 acres

The following public lands would be held available for transfers to other federal and state agencies or appropriate private entities through withdrawals or exchanges initiated by those agencies or BLM.

**Lava Beds National Monument:** Approximately 200 acres of BLM-administered lands adjacent to the detached Petroglyph Point section of the monument. Inclusion of these lands in the monument would enhance resource protection and public use values. BLM would consult with the U.S. Bureau of Reclamation (Reclamation) to determine whether Reclamation lands adjacent to the Monument would be suited for transfer to the Park Service. During consideration of this transfer, the Park Service and adjoining private landowners would be consulted to determine whether equitable considerations require that portions of this area be sold or exchanged to the adjoining landowners.

**Tulelake WWII Relocation Center:** BLM-administered lands associated with the Tulelake Relocation Center around the Newell townsite. This land would be managed for preservation and stabilization, and may be transferred to another agency or appropriate private entity once long-term plans for preservation of historic lands are completed.

**USDA Forest Service:** (a) 400 acres of BLM-administered land in Cayton Valley are best managed by USDA Forest Service. These lands are adjacent to and nearly surrounded by Shasta National Forest lands (administered by the Lassen National Forest) northeast of Lake Britton in Shasta County. (b) 240 acres of BLM-administered land near Day and 360 acres of land near Big Lake in Shasta County are best managed by USDA Forest Service. These lands are adjacent to and similar in resource management issues to National Forest lands in the Shasta National Forest (administered by Lassen National Forest). (c) Approximately 1,300 acres of BLM-administered land near Rattlesnake Butte, south of Mt. Hebron, in Siskiyou County are best managed by USDA Forest Service. These lands are adjacent to, and similar in resource management issues to National Forest lands in the Klamath National Forest.

**California Department of Fish and Game (CDFG):** BLM-administered parcels that provide habitat for a sensitive species (sage-grouse) and are best managed as part of the adjacent CDFG Ash Creek Wildlife Area would be transferred to CDFG through an exchange or other action.

The AFO would consult with appropriate tribal governments prior to completing any proposed land exchange or sale. In accordance with existing laws and the policies of DOI, BLM would coordinate and cooperate with Native American tribes in their efforts to acquire land through an Act of Congress. The BLM AFO would continue to pursue cooperation and consultation through appropriate tribal consultation protocol agreements. Potential land sales would be examined on a case-by-case basis to evaluate equitable considerations and public policies that may be used to determine whether a tribe should be given consideration for purchase as an adjoining landowner, in accordance with Section 203(f) of the Federal Land Policy and Management Act (FLPMA).

### 3.8.3 Withdrawal Areas

Public lands administered by BLM may be withdrawn for specific purposes by agencies other than BLM. As part of the management of lands in the AFO area, BLM may be required to review current withdrawals to determine the need for continuation, modification, revocation, or termination of these withdrawals. Future withdrawals would be considered on a case-by-case basis in accordance with Section 204 of FLPMA. The Secretary of the Interior may act to terminate withdrawals other than those made by an Act of Congress.

### 3.8.4 Utilities, Transportation, and Telecommunications

A ROW grant is an authorization to use a specific piece of public land for certain projects, such as roads, pipelines, transmission lines, and communication sites. The grant authorizes rights and privileges for a specific use of the land for a specific period of time. In general, ROW applications are initiated by the public to address a need for access across BLM-administered lands. Other uses, such as communications facilities, require a ROW (lease) for use of public land.

ROWs are processed on a case-by-case basis. Although applicable land use plans may designate utility corridors, communication sites, and existing route upgrades and improvements, these ROW authorizations are subject to National Environmental Policy Act (NEPA) compliance prior to approval. Through the NEPA environmental analysis process, the ROW request may be either denied or substantially affected or altered to avoid impacts on other resources.

### ***Utilities***

Existing utility ROWs are shown on the Master Title Plats available in the AFO. The only designated utility corridor in the AFO area is a 200-foot-wide ROW for a Pacific Gas and Electric (PG&E) gas pipeline that runs through the Fall River Valley. This corridor was designated in the Four Rivers Area RMP. Designation of utility corridors is a highly controversial issue in the area, with the majority of residents strongly objecting to any corridor designations anywhere within the viewshed of their home, their recreation areas, or their normal driving routes.

### ***Telecommunications***

Management of communication sites has recently changed with the inception of the 1996/1997 regulations governing communication sites on USDA Forest Service and BLM management public lands. Any new or renewed ROW (lease) for a communication site will be managed under the new regulations (43 CFR 2800).

Four existing communications sites lie on public lands in the AFO area:

- Haney Mountain (in Shasta County), with a total of six authorized site users;
- Widow Mountain (in Lassen County), with a total of four authorized users;
- Little Valley (in Lassen County), with one authorized user; and
- Adin Hill (in Modoc County), with one authorized user.

## 3.9 Livestock Grazing

### 3.9.1 Historical Setting

The AFO is located in an area that has been grazed by livestock for more than 100 years. Heavy livestock grazing from the late 1800s to the 1930s contributed to changes in plant composition and a reduction in rangeland productivity within the field office area. The impacts of heavy grazing are exacerbated by effective fire suppression. Many of the Field Office's fire dependent ecosystems have not burned in over 100 years.



As a result, some of the key rangeland issues we face today, including vegetation change and soil loss, are the legacy of earlier mismanagement. Improved livestock management began following the passage of the Taylor Grazing Act in 1934. Livestock numbers were again reduced during the adjudication period of the 1960s. Today, livestock grazing use adjustments are based on the interpretation of monitoring data and ecosystem management concerns.

### 3.9.2 General Management Approach

Grazing resources and livestock use are characterized according to three broad categories of information: the grazing animals, the management that controls their movements, and the range resources supporting grazing activities. Animals are described by species, age, numbers, breeding arrangements, herd sizes, herd sex ratios, and food preferences. Management is described by how and when animals are brought to BLM-administered land, the numbers turned out, the methods for controlling their movements, and how and when the animals are removed. These descriptors are defined in the grazing permits held by permittees. BLM rangeland is divided into grazing allotments, which are further divided into pastures. Within the allotments, animal movements are controlled through the use of pasture fences, drift fences, and locations of water sources. Permits are valid for 1–10 years, but permit conditions can be changed on an annual basis in response to BLM monitoring of range condition. Grazing resources also are affected by management practices when grazing animals are not present.

Range resources that support grazing activities consist of vegetation as well as other components such as water, minerals, and cover. The carrying capacity for grazing animals of a particular given area of rangeland, described in terms of animal unit months (AUMs), consists of the number of animals that can be supported by the range while meeting required standards. The relative composition and quality of forage species, in concert with animal food preferences, contributes to quantification of the carrying capacity (Heady 1975).

Rangeland and livestock are managed by establishing discrete allotments and issuing livestock permits for these allotments. Allotment management plans (AMPs) are developed based on the site conditions, including the availability of water and forage and other resource sensitivities within each allotment. AMPs are developed in a process that is compliant with NEPA and consistent with the broader governing RMP. Basic permit conditions are established based on the provisions of the AMPs and are adjusted annually, through a monitoring process, to reflect current rangeland conditions and sensitivities. Permits are generally issued for 10 years.

### 3.9.3 Current Livestock Grazing Conditions

Of the 503,045 acres of BLM-administered lands within the boundaries of the AFO, 457,519 acres (representing 91%) are presently in grazing allotments. Within these allotments, 54,881 AUMs are currently allocated to 24,379 head of cattle, 2,083 head of sheep, and 2 horses. Currently, 111 grazing permits are held by 108 permit holders on 145 allotments. The permits typically allow for use from May through September.

#### ***Rangeland Health Assessment Determinations***

Rangeland health assessment (RHA) determinations rate grazing allotments according to the following four categories:

- Category 1 – Areas where one or more standards are not being met, or significant progress is not being made toward meeting the standard(s) and livestock grazing is a significant contributor to the problem.
- Category 2 – Areas where all standards are being met or significant progress is being made toward meeting the standard(s).
- Category 3 – Areas where the status for one or more standards is not known, or the cause of the failure to meet the standard(s) is not known.
- Category 4 – Allotments where one or more of the standards are not being met or significant progress is not being made toward meeting the standards due to causes other than (or in addition to) livestock grazing activities. (Those allotments where current livestock grazing is also a cause for not meeting the standards is included in Category 1, in addition to this category)

Table 3.9-1 shows the numbers and acreages of the allotments in each of the RHA categories.

**Table 3.9-1** Allotments by Rangeland Health Assessment Category in the Alturas Field Office Area

<b>Rangeland Health Assessment Category</b>	<b>Number of Allotments</b>	<b>Acres</b>
1	18	150,000
2	19	112,529
3 <sup>a</sup>	100	154,657
4	8	35,859

<sup>a</sup> Unsurveyed.

Historically, all allotments were placed in selective management categories. Based primarily on current rangeland condition, the three approaches are improve (I), maintain (M), and custodial (C). The criteria for applying each of these approaches are as follows:

- Improve – Allotments generally have the potential for increasing resource production or conditions, but are not producing at that potential. There may be conflicts or controversy involving resource conditions and uses, but there are realistic opportunities to enhance resource conditions.
- Maintain – Allotments are in satisfactory resource conditions and are producing near their potential under existing management strategies. There are little or no known resource use conflicts or controversies.
- Custodial – Allotments usually consist of relatively small acreage or parcels of public land. They are often, but not always, intermingled with larger amounts of non-federally owned lands. There should be no known resource conflicts involving use or resource conditions. Typically, opportunities for positive economic returns from public investments are limited on these lands.

BLM selectively directs funds, monitoring emphasis, and management efforts where they will be the most effective. The major emphasis for development is the “improve” category allotments. Table 3.9-2 shows the number and acres of grazing allotments in each of the management categories.

### **3.9.4 Current Livestock Management**

The primary management objective for livestock management has been to increase perennial grass composition. Management to meet this objective has been accomplished primarily through the use of pasture fences and development of strategically placed water sources. Other management actions include defining the season of use and voluntary reduction of use by permittees.

**Table 3.9-2** Grazing Allotments by Management Category in the Alturas Field Office Area

<b>Management Category</b>	<b>Number of Allotments</b>	<b>Acres</b>
Improve	17	192,744
Maintain	32	173,888
Custodial	96	90,277

#### ***Management on BLM-Administered Land***

Present management includes turning out the permitted number of livestock onto designated pastures within an allotment and removing them according to the annual terms and conditions. Animal distribution and movements are controlled by fencing, water distribution, or active herding. “Deferred-rotation” is the primary grazing system being implemented. Under this system, all pastures are rotated and grazed at a different time each year. Livestock are generally herded between pastures and/or trucked between allotments.

#### ***Management on Adjacent Land***

Alternative (off-season) pastures are obtained from USDA Forest Service allotments, leased private lands, home ranches, or out-of-area pastures or feedlots. Presently, approximately 50% of the stock that are permitted on BLM lands are pastured offsite in the Sacramento Valley during the winter. This proportion varies from year to year as a result of changing range and market conditions. The herd size ranges from 2 to 600 head. Family and small business owners control approximately 95% of the herd using BLM-administered land; the remainder is under the control of corporate entities.

### **3.9.5 Observed Trends**

#### ***Range Conditions***

BLM is enhancing range conditions by controlling animal numbers, regulating season of use, and resting ecosystems subject to catastrophic damage (principally fire). Monitoring the activities applied according to procedures and criteria laid out in the Standards and Guidelines provides information on relative rangeland health and identifies animal management actions needed to protect the resource.

Forage production and availability naturally fluctuate annually in the AFO area. Drought conditions can trigger alteration of annual permit conditions. Natural or management-associated processes that are considered to move range health away from the desired conditions include:

- Encroachment of juniper into low and big sage and oak woodland communities;

- Sheet erosion and pedestalling (loss of soil except where held as “pedestals” by the roots of individual plants);
- Increasing competition from invasive weed species;
- Decline of watercourse health;
- Decline of riparian area health and functioning;
- Trampling of soils and streambanks by livestock, and impacts from trails or roads along the drainages and in the riparian areas;
- Decline in important forage shrub species as a result of drought; and
- Wildfire.

Because invasive annual species are established in most pastures, implementing management practices would increase the extent of perennial grass species but likely would not restore historical levels of perennial dominance.

#### ***Grazing Management***

BLM and permittees have committed to improving public lands so that livestock forage and ranching can be sustained. Despite inherent difficulties, many local ranchers have changed grazing methods and have begun using new grazing strategies, which have shown dramatic improvement in maintaining the quality of rangeland. In addition, the quality and extent of riparian and sensitive upland vegetation types have increased because of these new and innovative grazing management techniques, which include shorter grazing seasons, modified spring grazing/summer grazing, and intensive management in riparian areas or pastures.

Enhanced management of streams and riparian areas through creation of livestock exclosures and riparian pastures, and intensive livestock management programs (e.g., redesigned fence configurations, frequent pasture moves, changes in season of use, and herding) have reduced effects of livestock concentration in sensitive areas—resulting in improved rangeland conditions.

Maintenance of greater amounts of residual plant material (vegetation that remains ungrazed at the end of the grazing season) in upland and riparian habitats has enhanced watersheds by improving water infiltration and reducing soil erosion, and allowing increased seedling establishment to increase ground cover. Although these improvements have been positive, some areas continue to require management changes. The riparian and upland assessments have identified areas that need attention if rangeland health is to be sustained (see Chapter 3.16, “Vegetation”).

### 3.10 Recreation and Visitor Services

The major recreation activities in the planning area include general sightseeing, driving for pleasure, scenery and wildlife viewing, hiking and backpacking, recreational horseback riding, photography, hunting and fishing, camping, picnicking, rock hounding, caving, and driving off-highway vehicles (OHVs). The highest level of recreation use occurs over Memorial Day and Fourth of July holiday weekends and during hunting seasons. Recreational use is generally heavier during summer, but the area also receives intense use during the various hunting seasons in fall and early winter. Fishing is a popular activity and takes place spring through fall. Self-contained camping in association with hiking, and sightseeing is also popular throughout the area. Campers concentrate where the hunting is good or nearby, where shade or water is available.



Three major highways and numerous county roads traverse AFO lands. This transportation system provides access to a number of roads (both primitive and maintained) on BLM-administered lands. Significant routes within this transportation network include two designated national scenic byways: portions of the Volcanic Legacy Scenic Byway All American Road and the Emigrant Trails Scenic Byway. Given the considerable means of access, dispersed recreation opportunities exist throughout the entire planning area. Although limited in number, there are also opportunities for developed recreation at several sites within the planning area. Adjacent areas of interest managed by other agencies include the Modoc and Lower Klamath National Wildlife Refuges (NWRs); the Ash Creek and Butte Valley State Wildlife Areas; Lava Beds National Monument; and the Modoc, Lassen, and Klamath National Forests. Although the majority of visitors to the AFO area are from California and Oregon, an increasing number are from other states. There is a wide variety of opportunities for self-reliant recreational pursuits in northeastern California.

The recreation opportunity spectrum (ROS) is a system of classifying areas where recreation occurs; the system recognizes that people want and need different recreation experiences, and that the resource base has a varying potential for providing recreation experiences. Through the ROS, management can characterize demand for various types of recreation experiences and direct management to provide a variety of opportunities. In the system, combinations of recreation experiences, settings, and activity opportunities are arranged along a spectrum or continuum—with six classes as the primary division points. The spectrum approach is used to allow for the fact that the activities and experiences in one class may often be found in others, depending on the site-specific situation. The ROS classes are ‘Primitive’, ‘Semi-primitive Non-motorized’, ‘Semi-primitive Motorized’, ‘Roaded Natural’, ‘Rural’, and ‘Urban’. Each class is defined in terms of a combination of the types of activities and recreation experiences one would generally expect in those areas. For example, a primitive area would be managed so that one could experience backpacking with little or no contact with other people and minimal evidence of management or improvements. Table 3.10-1 describes the current ROS designations for the AFO area.

**Table 3.10-1** Recreation Opportunity Spectrum Designations for the Alturas Field Office Area

Designation	Acres
‘Primitive’	46,784
‘Semi-Primitive Non-Motorized’	64,972
‘Semi-Primitive Motorized’	283,949
‘Roaded Natural’	107,340

### **3.10.1 Special Recreation Permits**

Special recreation permits are authorizations that allow for recreational use of the public lands and related waters. They are issued as a means to manage visitor use, protect natural and cultural resources, provide for the health and safety of visitors, and provide a mechanism to accommodate commercial recreational uses. For four types of uses, these permits are required: commercial competitive, organized groups/events, and individual or group use in special areas.

In most recreation areas, management to facilitate recreation opportunities is limited primarily to providing basic information and access. BLM sometimes recognizes the need to more intensively manage specific recreation activities by designation of a special recreation management area (SRMA). In terms of recreation, all public lands that are not identified as being within an SRMA are considered to be extensive recreation management areas; generally, there are minimal improvements or development to support recreation activities in these areas. People visiting extensive recreation management areas are expected to rely heavily on their own equipment, knowledge, and skills while participating in recreation activities. Currently, all lands within the AFO area are managed as an extensive recreation management area; no SRMAs have been designated. All of the WSAs and developed sites are included in the existing extensive recreation management area.

The Pit River Campground is the only developed campground; Dry Creek Station and Cinder Cone campgrounds are smaller and more primitive. Although these campgrounds have been the sites of BLM investment in facilities, the extensive recreation management area as a whole has not been given sufficient management attention to elevate these areas to SRMA status.

Lack of an SRMA designation does not indicate that an extensive recreation management area does not have unique resources and associated recreation uses. In the past, the mix of these resources, levels of visitor use, visitor use issues requiring special management attention, and agency funding to administer these areas did not warrant the need for BLM to designate an SRMA for the area.

### **3.10.2 Non-Motorized Activities**

Pronghorn and deer hunting occur throughout the AFO area during the various fall hunting seasons. Upland game hunting is also popular for quail, dove, and rabbits.

The AFO area has public lands in four highly sought after wildlife hunting zones: X5b (southeast of Madeline), X3b (Warner Mountains), X3a (Nelson Corral Reservoir/Likely Mountain), X2 (Devil's Garden), and portions of western Zones X1 and X4.

Demand for antelope and deer tags in these zones far exceeds the available supply. Those hunters who draw a tag highly value their opportunity to hunt in these zones that extend into and, in some cases, are entirely within the AFO jurisdiction—as are the Likely Tables, which has the largest wintering population of antelope in California.

Waterfowl hunting is probably the highest single hunting use in the field office area, occurring from October through January on most of the larger or perennial reservoirs in the area. Modoc and Siskiyou Counties hold regional fame as the best waterfowl hunting in northeastern California.

Recreational fishing opportunities are widespread in reservoirs and streams, and fishing is one of the most popular resources uses in the AFO area. Recreational fishing in reservoirs on BLM lands is generally limited to warm water species in the western portion of the field office. Several reservoirs in the eastern lands contain coldwater fisheries, as well as others that are warm water fisheries.

Recreational shooting is popular throughout the AFO area. Target shooting commonly occurs at the Portuguese Flat allotment, the Day Cinder pit, and at most of the major reservoirs from spring through late summer. Gun ownership and firearms use are a traditional way of life for many rural area residents, which further increase the overall amount of shooting activity that occurs on public lands in the area.

Visitors to the public lands in the AFO area also participate in hiking and mountain biking, especially in areas with significant scenic values. The Pacific Crest Trail, which is a nationally designated hiking trail, enhances the hiking experience as it passes through outstanding vistas and rugged volcanic landscapes. Miles of dirt roads afford many mountain bike riding opportunities, including loop rides. The Likely Mountain Challenge, Woodland Jurassic, and Devil's Garden Bicycle Rides all offer a variety of challenging rides.

Exploration of areas in the AFO area provides a vast array of opportunities for mountain bike rides in the backcountry. There is high potential to develop single-track trails on BLM lands throughout the field office area. Routes in the Mahogany Mountain area provide bicyclists with excellent panoramas and diverse, challenging rides. Hiking also takes place on dispersed public lands throughout the field office area, as well as at identified recreation sites.

Two winter cross-country ski areas are located within the AFO area: the Nelson Corral High Country Trails and the Dead Horse Loop Area. Although neither area has facilities, the open country, primitive conditions, and scenic panoramas all contribute to the mystique of the area.

Extensive wildlife viewing opportunities exist in the AFO area, in part due to its proximity to the Lower Klamath NWR, Tulelake NWR, and large tracts of agricultural lands. In addition, two locations within the field office are included in the California Wildlife Viewing Guide: Kelly Reservoir near Alturas, and Beaver Creek southeast of McArthur. Wildlife, including wild horses, pronghorn, bald eagles, deer, wading birds, shorebirds, and waterfowl, attract numerous visitors to designated viewing locations throughout the field office area. Riparian corridors, such as Beaver Creek, are important for migratory, neotropical birds and other species dependent on riparian habitat—and attract many birding enthusiasts.

### 3.10.3 Off-Highway Vehicle Use

OHVs include motorcycles, all-terrain vehicles (ATVs), and four-wheel drive vehicles. Presently, OHV activity is allowed on BLM-administered lands only in areas where it has been determined that the activity will not adversely affect resources. Monitoring the effects of OHV use on heritage or cultural resources, soil loss on trail systems, and impacts on fish and wildlife are used to assess impacts of OHV use. The current designations for OHV use areas on BLM-administered lands are as follows:

- *'Open' areas* allow for all types of vehicle use, at all times, anywhere in the area.
- *'Limited' areas* are restricted at certain times, in certain areas, or to certain vehicle use. Examples include seasonal limitations, requirements to use only existing roads and trails, and requirements to use only designated roads and trails.
- *'Closed' areas* are areas where OHV use is prohibited.

In general, the public lands administered by the AFO area are fairly rocky and discourage off-road travel. Most vehicles travel on BLM system roads and stay within the road and shoulder.

However, new developments in OHV four-wheel technology have made the off-road landscape easier to navigate. In the AFO area, OHV use occurs throughout the year but is most intensive during hunting season.

### **Chapter 3: AFFECTED ENVIRONMENT**

Much of the AFO area is designated as open area unless specific management objectives or concerns were identified that would warrant OHV limitations. Concerns, such as sites listed in the NRHP, archaeological sites, presence of sensitive plant populations, riparian corridors, or areas adjacent to a national wildlife refuge have led to restrictions on OHV use—normally limiting use to designated roads and trails. Depending on the resource concern, an area may be completely closed to OHV use in the AFO area.

A route inventory was completed in the summer of 2004 that inventoried all roads and trails in the AFO area. Road designations of open, limited, or closed were applied to approximately 902 miles of roads and trails in the AFO area.

## **3.11 Social Conditions**

This section describes the social conditions of counties that fall within the AFO area. As previously mentioned, the AFO encompasses portions of Modoc, Lassen, Shasta, and Siskiyou Counties. A characterization of the communities and place-based values in the AFO area is provided below.

### **3.11.1 Communities**

The AFO planning area includes most of Modoc County, except for an area on the east side of the county (generally east of the Warner Mountains) that is within the planning area of the Surprise Field Office. The planning area includes the City of Alturas, which is where the BLM administrative offices are located; and the communities of Adin, Canby, Davis Creek, Day, Likely, Lookout, Newell, New Pine Creek, and Tionesta.

In Lassen County, the planning area includes the communities of Bieber, Madeline, Little Valley, Nubieber, and Pittville; Termo is immediately adjacent to the area. It should be noted that although Modoc County has the largest amount of area within the AFO planning area (approximately 53%), the greatest share of actual BLM land managed by the AFO is in Lassen County. Approximately 52% of BLM land managed by the AFO is in Lassen County and 29.4% is in Modoc County.

Approximately 331,334 acres of the AFO planning area and 46,522 acres of BLM land are located in Shasta County. Shasta County communities in the planning area include Burney, Cassel, Dana, Fall River Mills, Glenburn, Hat Creek, Johnson Park, and McArthur.

Approximately 889,956 acres of the planning area and 42,712 acres of BLM land are located in Siskiyou County. The communities of Tulelake, Macdoel, and Mt. Hebron are located in the planning area. Dorris is immediately adjacent to the planning area.

The extent to which the management of BLM lands by the AFO benefits or otherwise affects communities varies substantially, depending on such factors as how close the communities are to BLM-managed lands; how much BLM land is in the vicinity of the community, and whether commercial operations, including ranches, in the community operate in association with BLM resources. For example, virtually no BLM-managed land is in the immediate vicinity of Tionesta. Some commercial services (e.g., restaurants and motels) in such communities may benefit from BLM staff or from travelers going to and from BLM lands (e.g., recreational visitors) that periodically patronize those services.

Other communities have a more substantial relationship with BLM's immediate presence because more BLM employees live there, more money is spent in those communities for BLM-related operations and activities, or the greater extent of public use of BLM-managed land in those areas otherwise stimulates economic activities and the use of local businesses. The Alturas Field Office is located in the City of Alturas. Consequently, Alturas and the immediate vicinity of Modoc County receive a greater share of the benefits and effects of BLM employees working and living in the area. For more information about economic conditions, see Chapter 3.3 "Economic Conditions".

### **3.11.2 Placed-Based Values**

In the case of Modoc County, much of the prevailing attitude toward place-based values, local lifestyle and relationship of the community with BLM-managed lands—as summarized by the County Board of Supervisors—is characterized in the Comprehensive Land Use and Management Plan for the Federally and State Managed Lands in Modoc County (Modoc Land Use Plan), adopted in 1995. The following excerpt from the Modoc Land Use Plan describes in part why it was adopted:

The Board is well aware that the historical, overriding and predominant goal of the County's citizens, and therefore its government, has been the continuation of a lifestyle which assures the highest degree of protection of these rights. Property rights and interests are important to the independent people who now live and work in this rugged, mostly remote County which has an enormous land mass larger than some states in the Union but a population as small as some villages. People who live in this County are reliant on the land and its productive use (Modoc Land Use Plan 1995).

In discussing the custom, culture, and economic base of Modoc County, the Modoc Land Use Plan states that, historically, the custom and culture of Modoc County is a story retold in many western counties. The settlement of the county is the history of the livestock, farming, logging, mining, and railroad industries—led by hardy individuals willing to work and develop the resources of the land to bring forth a community.

The people of Modoc County have historically and traditionally earned their livelihood from activities reliant on natural resources. The economy of the County has always been and is today dependent on and economically related to the availability and utilization of natural resources and reasonably accessible water supplies. Either directly or indirectly, the majority of the persons employed in Modoc County are dependent on ranching and farming, forest production, mining, recreation, and other activities related to and reliant on the availability of natural resources (Modoc County Board of Supervisors 1995).

The Lassen County General Plan notes that, like many rural communities in the West, Lassen County has an historic and strong cultural background, socially and economically, related to the livestock industry and other rangeland uses. Many customs and general attitudes in the area, especially outside of the more urbanized areas, reflect that heritage. Many residents in rural counties to some degree embrace this heritage or theme whether or not they are actually involved personally in ranching or agriculture.

The Siskiyou County Comprehensive Land and Resource Management Plan states: Custom, as used in the context of the Comprehensive Plan, refers to land or resource usages and practices that have "acquired the force of a tacit and common consent". Such land uses and practices, livestock grazing, logging, farming, mining, recreation and hunting, to mention just a few, are concrete, readily identifiable and are the foundation of Siskiyou County's economy.

These attitudes or values are also subject to transition influenced by shifting demographics. As more people move into rural areas from urban areas to take government, service, and other non-agricultural jobs, they bring different expectations and opinions about the use of open space lands.

Many residents value the scenic quality, wildlife and open space values, and resources of the area's rangelands—much of which is land managed by BLM. The availability of open land for dispersed recreation, or simply the appreciation of looking out across undeveloped landscape, is an asset valued by a large part of the local population as well as by visitors from other areas of the world.

The Natural Resources Element of the Lassen County General Plan notes that, because of political responsiveness of county government to the people and communities within the boundaries of the county, Lassen County is also the agency having the most immediate concern with the social and economic needs of the citizens of Lassen County. The Natural Resources Element goes on to observe that the resource policies and management practices of federal and state agencies can significantly affect private land and the welfare of the people who live and work in Lassen County. These agencies need to coordinate with the County and with each other to be responsive to the range of social, economic, environmental, and other needs; impacts and ramifications relating to resource management issues that affect the economic and social well-being of the people of Lassen County, and the long-term value of the County's natural resources.

The issue of livestock grazing and the value to local ranchers of grazing permits on federal lands is often used by local communities to epitomize the relationship of public land use with the lifestyle and economics of these communities. Livestock grazing is permitted by BLM under terms and conditions set forth in grazing permits. A number of ranching operations in Lassen County and other counties in the area rely on such permits for grazing allotments on public lands. The Lassen County General Plan Agriculture Element states that the economic viability of these livestock operations is substantially dependent on the continued and economical use of these rangeland resources, and that there is a direct relationship between federal grazing privileges on dependent ranches and the economic viability and market value of the private real estate of those operations.

The Lassen County General Plan maintains that, if grazing allotments are no longer available or rendered economically impractical due to increased grazing fees, extensive management requirements, or reduced capacity, the home ranches that depend on them may, in turn, be rendered economically unviable. This may cause or contribute to the financial failure of small ranching operations which, in addition to being tragic at the personal level to the families involved, contributes to pressures for the conversion of land that is in agricultural production to other, more immediately profitable non-agricultural uses.

Similar attitudes and policy positions are prevalent with the Boards of Supervisors in Modoc, Shasta, and Siskiyou Counties—where there is general sympathy for the economic challenges faced by timber companies, farmers, and ranchers, as well as concern over the loss of jobs and tax revenues. There is general concern for the protection and stewardship of natural resources, but much of the concern is expressed in terms that economic considerations are high priorities in the making of resource management decisions (e.g., the need to supply mills with timber or to provide adequate grazing resources for livestock).

With the increase of tourism as a significant component of local economic vitality, and with continued appreciation for the scenic and recreation resources in all four counties, there is also general concern over the need to protect the natural resources and open space values that attract visitors to the area.

The Shasta County General Plan includes the following statement concerning attitudes toward the areas quality of life:

Unquestionably, the most distinguishing characteristic of Shasta County is the quality of life enjoyed by its residents. Many terms are used to describe the nature of this quality of life, including rural living, small town atmosphere, or country lifestyle. The quality of life has and will continue to attract new residents to Shasta County. The irony of this situation is that the very attractiveness of this quality of life, if present trends are allowed to continue, could eventually lead to its destruction (Shasta County General Plan, Page 3.0.01)

Some sites in the AFO planning area are important to the cultural heritage and lifestyles of local Native Americans. Of particular concern are sacred or otherwise significant cultural sites.

The Rangeland Reform '94 Draft Environmental Impact Statement (EIS) states that cultural resources can be divided into two broad categories: cultural properties and traditional lifeway values (BLM 1994). A traditional lifeway value is important for maintaining a specific group's system of religious belief, cultural practice, or social interaction. Lifeway values may or may not be closely associated with definite locations.

In general terms and with broad geographic scope, the following excerpt from the Rangeland Reform '94 Draft EIS provides a concise statement concerning Native American place-based values. Some of these points may be applied to consideration of place-based values relating to BLM lands in the AFO planning area:

Native Americans use their local environment to gather native plants, animals, and minerals for use in religious ceremonies, rites of passage, folk medicine, subsistence, and crafts. In Native American religious practice, any environment can contain specific places that are significant for spiritual purposes. Those sacred places embodying spiritual values are often associated with indigenous rock art, medicine wheels; rock cairns and effigy figures, spirit trails and spirit gates, caves, and springs or lakes. Contemporary use areas are associated with traditional plant and mineral collection locales, vision quest sites, Ghost dance sites, shrines, and traditional trails (Rangeland Reform '94 Draft EIS, Page 3-55.)

Chapter 3.2 "Cultural Resources" should be consulted for a more specific discussion of cultural resources in the planning area.

### 3.12 Soil Resources

The primary indicators for soil resources are soil/site stability and hydrologic function. These indicators are part of BLM's Land Health Assessment (LHA), and are used to assess soil health in the context of BLM's Standards and Guidelines (S&Gs). The LHA provides 12 indicators that are used to rank soil/site stability and hydrologic function into five categories: (1) slight to no deviation from what would be expected on a reference site, (2) slight to moderate deviation, (3) moderate deviation, (4) moderate to extreme deviation, and (5) extreme deviation.



For consistency with other assessments, ratings 1 and 2 are considered to be in 'Proper Functioning Condition' (PFC), rating 3 is considered 'Functioning At Risk', and ratings 4 and 5 are considered 'Non-Functional'.

Soil/site stability ratings reflect the capacity of a representative site to limit redistribution and loss of soil resources (including nutrients and organic matter) by wind and water. Hydrologic function reflects the capacity of the site to capture, store, and safely release water from rainfall, runoff, and snowmelt (where relevant); to resist a reduction in this capacity; and to recover this capacity following degradation.

#### 3.12.1 Geographic Relationships and Distribution of Soils in Major Land Resource Areas

Major land resource areas (MLRAs) are geographically associated land resource units (LRUs). LRUs are geographic areas, usually several thousand acres in extent, which are characterized by a particular pattern of soils, climate, water resources, and land uses. A unit can be one continuous area or several separate nearby areas.

LRUs are the basic units from which MLRAs are determined. They are also the basic units for state land resource maps. They are coextensive with state general soil map units, but some general soil map units are subdivided into LRUs because of significant geographic differences in climate, water resources, and land use (USDA 2003).

The AFO area falls within three MLRAs identified by the USDA: MLRAs 21, 22, and 23 (Earth System Science Center 1998). Most of the AFO area is located within MLRA 21.

#### **MLRA 21 – Klamath and Shasta Valleys and Basins– California and Oregon (35,350 km<sup>2</sup>/13,650 mi<sup>2</sup>)**

MLRA 21 is located within the AFO area. The dominant soils are Xerolls, Aquolls, Aquepts, Aquent, Xererts, Albolls, and Argids. These soils have a mesic or frigid temperature regime. Soils in basins and on floodplains and terraces are Andaquepts (Tulana series), Argialbolls (Goose Lake series), Pelloxererts (Pitts series), Durargids (Trosi series), Halaquepts (Lolak series), Natrargids (Rumbo series), Durixerolls (Bieber series), Haploxerolls (Mottsville series), Argixerolls (Trojan, Galeppi, and Drews series), and Haplaquolls (Ramelli and Deven series). Soils on upland plateaus and mountains are Argixerolls (McQuarrie series), Haplargids (Casuse and Saralegui series), Chromoxererts (Karcas series), and Durargids (Packwood series). Large areas of rock outcrop are on the plateaus and in the mountains.

**MLRA 22 – Sierra Nevada Range– California and Nevada (65,190 km<sup>2</sup>/26,170 mi<sup>2</sup>)**

MLRA 22 is located in a small section of the western part of the AFO area and in a small section of the extreme eastern part of the AFO area. The dominant soils are Xerults, Humults, Xeralfs, Xerolls, Ochrepts, Umbrepts, Andepts, Orthents, Psamments, and Boralfs. These soils have a mesic, frigid, or cryic temperature regime, depending largely on elevation. Soils at elevations below 3,900–4,900 feet are Haplohumults (Sites and Aiken series), Haploxeralfs (Secca, Holland, and Cohasset series), Xerochrepts (Chaix and Maymen series), Haploxerults (Josephine and Mariposa series), Vitrandepts (Iron Mountain and Jiggs series), and Haploxerolls (Shaver series). Soils at higher elevations are Xerorthents (Dinkey series), Xeropsamments (Corbett and Toiyabe series), Cryopsamments (Cagwin series), Cryoboralfs (Fugawee series), Cryumbrepts (Meeks series), Cryochrepts (Umpa series), Cryandepts (Meiss and Waca series), and Dystrandepts (Windy series). Large areas of rock land are scattered throughout the area and on broad expanses on ridge crests and peaks above the timberline (7,900 to 8,900 feet). Soils in mountain valleys are Haploxerolls (Oak Glen series), Xeropsamments (Elmira series), Haploxeralfs (Inville series), Humaquepts (Chummy series), and Cryaquepts. Soil survey information is lacking for extensive areas.

**MLRA 23 – Malheur High Plateau – California, Nevada, and Oregon  
(73,050 km<sup>2</sup>/28,210 mi<sup>2</sup>)**

MLRA 23 is located in a small section in the southeastern part of the AFO area. Most of the soils are Argids or Orthids. They are shallow to moderately deep, with a medium-textured to fine-textured subsoil and a frigid or mesic soil temperature regime. Nearly level to sloping, well-drained Durargids and Durorthids have a duripan and are on lake terraces and fans. Somewhat poorly drained Durorthids in low areas are commonly saline and sodic. Sloping to steep, well-drained to excessively drained, shallow, stony Xerolls are on uplands.

**3.12.2 Assessment of Soil Condition and Present Management of Soil Resources**

The LHA indicators were used to evaluate how well the soils standards in BLM's S&Gs are being met. The two summary ratings, soil/site stability and hydrologic function, and the 12 indicators were reviewed for the following discussion. The 12 LHA indicators are listed below.

1. Rills
2. Water flow patterns
3. Pedestals and terracettes
4. Bare ground
5. Gullies
6. Wind scour, blowout/depositional
7. Litter movement
8. Resistance to erosion
9. Soil loss or degradation
10. Plant community composition/distribution relative to infiltration and runoff
11. Compaction
12. Litter amount

Soils are in relatively good condition in the AFO area. Seventy-eight percent of the sites are rated as PFC for soil/site stability, and 80% are rated as PFC for hydrologic function.

### **North Fork/South Fork Watershed**

Of the sites evaluated in the North Fork/South Fork watershed, 53% are rated as having soil/site stability in PFC, 35% are rated as 'Functioning at Risk', and 12% are rated as 'Non-Functional'.

The summary hydrologic function rating had 53% of the sites in PFC, 41% 'Functioning at Risk', and 6% 'Non-Functional'. In descending order, pedestals and terracettes, soil loss or degradation, resistance to erosion, and bare ground were the primary indicators of reduced soil condition.

### **Warm Springs/Big Valley Watershed**

Of the sites evaluated in the Warm Springs/Big Valley watershed, 70% are rated as having soil/site stability in PFC, 25% are rated as Functioning at Risk, and 5% are rated as Non-Functional. The summary hydrologic function rating had 80% of the sites in PFC, 15% Functioning At Risk, and 5% Non-Functional. In descending order, pedestals and terracettes and plant community composition/distribution relative to infiltration and runoff were the primary indicators of reduced soil condition.

### **Tulelake/Devil's Garden Watershed**

Of the sites evaluated in the Tulelake/Devil's Garden watershed, 84% are rated as having soil/site stability in PFC and 16% are rated as Functioning at Risk. The summary hydrologic function rating had 84% of the sites in PFC and 16% Functioning At Risk. In descending order, pedestals and terracettes and soil loss or degradation were the primary indicators of reduced soil condition.

### **Fall River Watershed**

Of the sites evaluated in the Fall River watershed, 100% are rated as having soil/site stability in PFC. The summary hydrologic function rating had 100% of the sites in PFC.

### **Goose Lake Watershed**

No data are available to assess the soil condition in this watershed.

### **Madeline Plains Watershed**

Of the sites evaluated in the Madeline Plains watershed, 93% are rated as having soil/site stability in PFC and 7% are rated as Functioning at Risk. The summary hydrologic function rating had 93% of the sites in PFC and 7% Functioning at Risk. In descending order, water flow patterns and resistance to erosion were the primary indicators of reduced soil condition.

### **3.12.3 Overall Trends in the Alturas Field Office Area**

The natural factors listed below affect soils in the AFO area:

- Wildfires
- Wind events
- Floods and
- Noxious weeds

The management-related factors listed below affect soils in the AFO area:

- Wildfire suppression activities

### **Chapter 3: AFFECTED ENVIRONMENT**

- Livestock management
- Wild horse management
- Fuels management
- Noxious weed management
- Recreation/OHV management
- Mineral exploration/mining

Western juniper encroachment is severely affecting the soils of the AFO area by replacing natural sagebrush steppe ecosystems and crowding out pine forests and aspen groves. Juniper encroachment stems from fire suppression over the last 150 years. Juniper encroachment affects soils in riparian areas by competing with woody species such as willow and elderberry. Increasing juniper canopy is affecting soils in the uplands by shading out grasses and sagebrush, thus decreasing the extent of forage as well as soil stability.

### **3.13 Special Designations – Areas of Critical Environmental Concern**

BLM uses several designations to identify areas that require special management to protect resources or provide unique recreation opportunities. The designations include ACEC, Scenic (Backcountry) Byways, Historic Trails, WSAs (prior to being declared Wilderness by Congress) and Wild and Scenic Rivers (WSRs). Maps ACEC-1, HT-1, SB-1, WSA-1, and WSR-1 illustrate these areas in the AFO, which are described in the following text.

ACECs are areas—designated and administered by a federal land management agency—that require special measures to (1) prevent irreparable damage to important archaeological/historic or other cultural sites, protect scenic values, fish and wildlife resources or other natural systems or processes; or (2) to preserve human life from natural hazards (DOI-BLM, ACEC Manual 1613.02).

43 CFR and BLM policy require that environmentally sensitive areas be evaluated and considered for special management as ACECs during the PRMP planning process. Areas that contain high-value resources or critical natural systems, processes, or hazards are eligible for consideration, if certain relevance and importance criteria are fulfilled. In order to meet these criteria, an area must contain significant historical, cultural, scenic, wildlife habitat, or other natural values. Furthermore, the site's importance must extend beyond the local level.

The designation of an ACEC is a BLM discretionary decision made through adoption of a PRMP. In order to protect the resource values that justified designation of each ACEC in this PRMP (see Appendix E. “ACEC Relevant and Important Criteria”), BLM is required to develop and implement an ACEC management schedule or an activity plan (BLM ACEC Manual 1613.6). Each ACEC's management schedule or activity plan will be unique to the resources to be protected and are “management measures that would not be necessary and prescribed if the critical and important features were not present” (BLM ACEC Manual 1613.1.12).

Designation of an ACEC does not automatically create land use restrictions that affect all ongoing or proposed land uses but rather, requires development of a set of management prescriptions tailored to protect the unique resource values for which the ACEC is established. Following adoption of this PRMP, a management schedule or activity plan for each ACEC will subsequently be developed, involving affected stakeholders, to set future management direction for the area. An ACEC designation applies to BLM lands and does not apply to private property rights and privately held water rights.

There is one existing ACEC in the AFO area, and one Natural Area. The Ash Valley ACEC consists of 1,322 acres and is located in the southern portion of the field office; it was designated to protect sensitive plants. The Baker Cypress Natural Area is located within the Timbered Crater WSA and has 1,448 acres.

### 3.14 Special Designations – Historic Trails

#### Euro American Exploration

The first recorded Euro Americans who explored this region were members of the Hudson Bay Company, and established Fort Vancouver on the Columbia River as their western outpost and primary center of operations. From Fort Vancouver they established trade routes throughout the, Pacific Northwest, the Great Basin, the high desert country of northeastern California, and traveled as far south as the Kings River near Fresno, California. Their principal mission was to trap

beaver in the rivers and streams of the Pacific Northwest. In 1826-1827, Chief Trader Peter Skene Ogden implemented the “fur desert policy” which was designed to denude the streams and rivers of beaver in an attempt to prevent the American trappers from invading their rich Oregon and Washington trapping areas.



**Pit River Canyon**

During Peter Skene Ogden’s first journey through the area, he lost several horses in the large pits that the Native Americans had dug into the river banks to trap large game, and accordingly he named this major river of the region the Pit River. In 1832-1833 Chief Trader John Work of the Hudson Bay Company was in the Pit River Country with a large fur brigade and covered much of the same area that Ogden had several years earlier. Both Ogden and Work trapped beaver on the South and North Forks of the Pit, as well as its major drainages. The first recorded American trapper was Ewing Young in 1832, once again exploring the Pit River country in Big Valley, and followed the Pit River down stream into Fall River Valley.

#### Emigrants

In the 1843, the first emigrant party passed through the Pit River country, led by Joseph Chiles. This group of men on horseback left the Oregon Trail, at the Hudson Bay Company post at Fort Hall, Idaho, traveled across the Oregon desert to Goose Lake in California, and generally followed the Pit River into the Sacramento Valley. In 1846 the Applegate brothers and Levi Scott forged the Applegate Trail, also known as the Southern Road to Oregon, from the west to the east. Once again, Goose Lake was a focal point in early exploration, and was named by Levi Scott due to goose feathers found along the margin of the lake. In 1848, Peter Lassen left Fort Hall, Idaho with a group of wagons and followed the Applegate Trail to Goose Lake, turned south towards the rich California goldfields, and eventually ended up near his rancho at Chico, in the upper Sacramento Valley. The California-Oregon Trail connected Oregon to the Lassen Trail in 1848, ran along the east side of the Tule Lake marsh, intercepted the Lassen Trail north of Big Valley, and followed the Lassen Trail to the upper Sacramento Valley. This Trail was pioneered by a group of gold seekers led by Peter Burnett, who later become the first governor of the state of California, and was guided by Thomas McKay, a veteran of the Hudson Bay Company fur trapping brigades. In 1852, the Yreka Trail followed the tracks of the Applegate Trail to the Lower Klamath Marsh, turned westerly towards Yreka and the goldfields of the Klamath country. The Yreka Trail was used in the early 1870’s, to freight supplies and troops to the Modoc War, and also became the Tichnor road, which was the main route from Yreka to Alturas. Trail traces from these Historic roads can be found on some of the public lands where development and impacts are at a minimum. Many of the old Emigrant roads have been re-aligned and incorporated into newer roads, and the trail traces have disappeared. The importance of these Emigrant Trails is evident in the directives, policies, and protection that federal land management agencies provide for the management of this vanishing resource.

## **U.S. Army Exploration**

The U.S. Army Topographical Corps played a major role in the exploration of this region in search of railroad routes from the Mississippi River to the Pacific Ocean, particularly involving the surveys and expeditions that involved the Central Valley of California, Northern California, and the Columbia River. The first military expedition into Northern California was the U.S. Exploring Expedition, led by Commander Charles Wilkes of the U.S. Navy in 1841. They crossed the Lower Pit River after departing the Columbia River country enroute to San Francisco. John Charles Fremont made four expeditions to the west with the U.S. Army Topographical Corps; in both the 1843 and 1846 expeditions, he passed through the Pit River country and named many of the local and regional rivers, mountains, and features. It is thought that Fremont named Fall River. In the 1843 journey, the famous mountain man Kit Carson was the party's guide. In the 1846 campaign, he had passed through the Fall River country when news of the Bear Flag revolt reached him near Klamath Lake, and promptly marched his force of 60 men back to central California and was instrumental in taking Alta California from the Mexican government.

John Fremont was a man of many talents: explorer, topographical engineer, U.S. Army officer, botanist, first governor of the territory of California, senator from California, and a presidential candidate for president of the U.S. But he is probably was known best for his expeditions and exploration of the west, and earned the name of the "Pathfinder". In 1849 Captain William Warner and Lieutenant R.S. Williamson of the U.S. Army Topographical Corps commanded a party of engineers and troops on an exploration of the upper Pit River country in search of a railroad route through the mountains to the east. Captain Warner and a small force of men were exploring the east side of the mountains, they were attacked, and Captain Warner and his guide were killed by Indians, and the mountains were named the Warner Mountains for Captain Warner. In 1854, Lieutenant E.G. Beckwith explored the Madeline Plains, Big Valley, and the Pit River, looking for railroad routes. In 1855, Lieutenant R.S. Williamson was once again back in the Pit River country looking for railroad routes, with two young lieutenants: George Crook, the quartermaster in charge of the pack train, who came into prominence later with his involvement in the Battle of the Infernal Caverns, the Sioux Wars, and the Apache Wars; and Phillip Sheridan, the officer in charge of the infantry and dragoons, who later came into prominence in the Civil war. This exploring party focused on the Fall River area, Big Valley, the Pit River, the Klamath Lakes, and then pushed north to the Columbia River.

## **U.S. Army/Native American Confrontations**

Hostilities began as soon as the first wagons entered the Modoc homeland in 1846 and gradually escalated until the end of the Modoc War in 1873. After re-occurring depredations from both sides, organized volunteer groups patrolled the established roads to protect emigrants from Native Americans attacks. The situation was inflamed further with incidents in 1852, like the Bloody Point massacre of 36 Applegate Trail emigrants in the Tule Lake basin, the failed peace talks with the Modocs, where 38 Indians died in a hail of bullets from the Yreka Volunteers. The Applegate Trail, also known as the Southern Road to Oregon, had a far more sinister name, "The Bloodiest Trail west", due to the many attacks, depredations, and deaths along the Trail. Fort Crook was established in 1857 in Fall River Valley, and Major R.S. Williamson selected the site for Fort Bidwell in 1866 to protect pioneers, emigrants, and travel routes. Military patrol routes were established along major emigrant roads, like the Lockhart Wagon Road, the Yreka, the Lassen, and the Applegate Trails. Both the U.S. Army and volunteer militias provided protection and needed supplies to the emigrants coming from the east, whose supplies were generally exhausted by the time they reached northern California.

In 1861, Evans and Bailey, two cattle owners from Roseburg, Oregon, were driving 900 head of cattle along the Lassen Trail to the Comstock mines of Virginia City, Nevada. The cattle drive was halted east of Canby, California, by a renegade band of Pit River Indians, wanting to trade deer hides for gunpowder and lead. Bailey and Evans were both killed and two drovers were wounded when the talks failed and fighting broke out, and all 900 head of cattle were driven off by the Indians. Troops from Fort Crook recovered some 300 head as far away as Goose Lake near the Oregon border, and Honey Lake 150 miles south.

The white encroachment and continuing hostilities during the ensuing years forced the Paiute, Modoc, and Pit River Tribes into more and more confrontations with the U.S. Army, volunteer militias, and pioneers. In 1867, General George Crook and a force of 108 regular army troops consisting of cavalry, mounted infantry, and Warm Springs Indian guides had a three-day battle with Paiutes, Pit Rivers, Modocs, and Snakes in a rugged lava landscape near Likely, California. The Indians escaped through the lava under the cover of darkness, similar to the final flight of the Modocs during the Modoc War five years later. This conflict was the Battle of the Infernal Caverns, widely known as one of the major regional confrontations between Native Americans and the U.S. Army in Northeastern California. This battle was a turning point in relations between the local Native Americans, settlers, and the U.S. Army.

Tensions and hostilities between the groups diminished after the Battle of the Infernal Caverns. The Battle of the Infernal Caverns and the area associated with it has been identified by the Pit River Tribe as a traditional cultural property and is regionally important to local Native Americans.

The hostilities in the region between the Native Americans and the U.S. Army reached a peak in the late 1860s and early 1870s. Finally in 1872, after 25 years of white encroachment and hostilities, the Modoc Nation fought the U.S. Army in one of the costliest wars ever waged by the U.S. government. The Modoc War was a nationally famous Indian war between the U.S. Army and the Modoc Tribe of northern California and southern Oregon. The Modocs were led by Captain Jack and other prominent Modoc warriors, including Scarface Charley, John Schonchin, Curleyheaded Doctor, Hooker Jim, and Boston Charley, in and around the exceptionally rugged volcanic terrain south of ancient Tule Lake. The war raged on into 1873, with Army losses of 68 soldiers, while only 16 Modocs were killed during the war, including Captain Jack and three others that were hanged for the murders of General Canby and Dr. Thomas. The final fight of the Hot Creek band took place during late May in their traditional homeland near Mahogany Mountain and Coyote Ridge. The public lands in this area provided the landscape for a running fight and the last skirmishes of the Modoc War, where the Hot Creek Band surrendered at the Fairchild Ranch on May 20, 1873. Captain Jack and his band surrendered June 1, 1873, east of Tulelake on Devils Garden. The end of the Modoc War signaled the last of the hostilities between settlers, Indians, and the U.S. Army in Northeastern, California.

New inventories, surveys, and accurate trail mapping are being used as management tools to protect the national historic trails and historic resources in the AFO area. Work is being conducted to determine the exact locations and distances of all listed trails.

### **3.15 Special Designations – Scenic (Backcountry) Byways**

Driving scenic byways has become a commonplace activity and an effective aid to rural tourism, especially where popular routes are conjoined. These routes may follow short, sinuous country roads or involve long-distance travel on major federal and state highways. They may include scenic vistas, points of interest, interpretive sites, and other attractions. Routes that qualify as ‘national scenic byways’ have more rigorously defined parameters.

Qualifying routes must be suitable for ordinary passenger vehicles and—in addition to outstanding scenery—require points of interest and other high-quality, tourist-oriented attractions and conveniences adjacent to the byway.

As previously mentioned, shorter routes are often narrow, winding country roads that offer outstanding scenery and other roadside attractions, such as wildlife-viewing, photography, picnicking, and the opportunity to explore historical or archaeological sites. Some routes are relatively rough, and more suited to adventurous drivers and high-clearance vehicles.

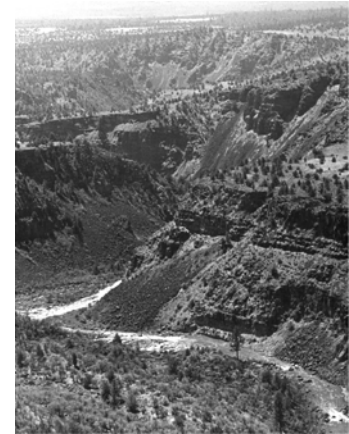
Other routes access trailheads for hiking or horseback riding, or rugged terrain requiring four-wheel drive. Such routes are associated with other recreational activities such as hunting, fishing, vehicular (self-contained) camping, rock-hounding, and caving. As one might expect, use is greatest on holiday weekends, particularly Memorial Day, the Fourth of July, and Labor Day. Peak use is in fall and summer; primarily for hunting and fishing (and self-contained camping associated with these activities) and, to a lesser degree, for sightseeing or hiking access.

No BLM Backcountry Byways are in the field office area; however, the Emigrant Trail Scenic Byway is a USDA Forest Service scenic byway that traverses public lands throughout the area. It was designated on March 31, 2003, because of its important historic, scenic, natural, and recreational resources. The scenic byway connects to the existing Outback Scenic Byway at the Oregon border and the Volcanic Legacy Scenic Byway All American Road in California. The Emigrant Trails Scenic route includes state and federal highways in Modoc and Siskiyou Counties, in California. Highways 395, 299, and 139 all lead to recreation designation areas. The roads are safe and open year-round.

### 3.16 Special Designations – Wild and Scenic Rivers

The Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended) provides that WSR considerations be made during federal agency land use planning. To comply with the act, an eligibility determination for rivers and streams in the AFO area was completed in 2003 for 21 rivers and streams. Rivers and streams were evaluated with respect to the eligibility requirements for potential inclusion in the National Wild and Scenic Rivers System. To be eligible, a river or stream segment must be free-flowing and must have an outstandingly remarkable value in at least one of the following areas: scenic, recreational, geological, fish, wildlife, historic, cultural, ecological, botanical, hydrological, or scientific study.

Three rivers and streams met the criteria for eligibility for potential inclusion into the National Wild and Scenic Rivers System and will receive further study. Eighteen rivers and streams did not meet the criteria for eligibility and will not receive further consideration; these are listed in Appendix J.



Pit River Canyon

#### Lower Pit River Canyon

The Lower Pit River Canyon is approximately 2.5 miles long and covers approximately 400 acres from rim to rim, with dynamic geology, wildlife, recreation, and historic values. There are no water impoundments along this reach of the Pit River. This section of the river is popular with some kayakers and rafters. The area is also used for hiking and fishing. A historical road that crosses the Pit River at the western border of this unit provides a non-maintained access route through the canyon. The Lower Pit River Canyon provides a wilderness-like setting near a major population center of northern California.

More individuals and groups are exploring areas in increasingly remote settings. BLM, PG&E, local community members, and the Clearwater Lodge have initiated planning for a series of recreational trails to promote tourism and health. Some of these trails would utilize existing roads and trails as the basis for the trail system, and would emphasize trails in the Lower Pit River Canyon Wild and Scenic River study area.

#### Horse Creek

The three-mile segment of Horse Creek recommended for inclusion in the National Wild and Scenic Rivers System flows through a pristine canyon before entering the Pit River. This segment covers approximately 400 acres of uplands and riparian habitats, abounds in wildlife, fisheries, history, and wilderness like solitude. Cold and warm water recreational fisheries are present in the canyon, as well as native minnow populations. Fishing pressure is light due to limited access and rugged topography. The outstandingly remarkable values are in the following areas: botanic/ecologic, historic, and wildlife. This segment of Lower Horse Creek is included in the Pit River Canyon WSA, which is recommended for inclusion in the National Wilderness System.

#### Upper Pit River Canyon

The Upper Pit River Canyon is approximately 13 miles long and covers 1500 acres of uplands and riparian habitats. This segment of the Upper Pit River Canyon WSR is included within the Pit River Canyon WSA, and recommended for inclusion into the National Wilderness System.

The canyon has outstandingly remarkable values in the following areas: geologic, scenic, wildlife, recreation, and historic values, with wilderness-like solitude values. The Pit River bisects a large basalt tableland and has formed a spectacular canyon with unique geologic features and scenery along the entire river course. The plateaus, lava reefs, and flats above the canyon are concentration areas for wintering populations of deer and pronghorn. The canyon and cliffs provide exceptional nesting habitat for large numbers of birds of prey.

The National Historic Lassen Emigrant Trail has two branches within the WSR unit, and was one of the early Emigrant Trails into California. A warm water recreational fishery is present in the canyon, but receives light use due to limited access and difficult topography. Late summer and early fall flows can be quite low due to diversions and irrigation in three large upstream valleys. The Malacha hydro project has a small diversion dam and water intake on the upper portion of the canyon on private land outside of the proposed WSR segment.

An underground tunnel skirts the outside of the Pit River WSA/WSR segment, transports Pit River water to a holding reservoir, then a buried penstock transports the water to the powerhouse, which is located on private land outside of the WSA/WSR segment. Only flows exceeding a designated volume in cubic feet per second can be diverted into the tunnel for use at the downstream powerhouse.

As individuals want more challenging recreational pursuits without crowded conditions, they will migrate to these more remote locations for hiking, sight seeing, and fishing. This area is fairly close to the largest population center in Northern California and can be expected to receive more use as time goes on.

### 3.17 Special Designations – Wilderness Study Areas

WSAs are designated by a federal land management agency as having wilderness characteristics. The Wilderness Act of 1964 defines a wilderness as an area where the earth and its community of life are untrammelled by people and where people are visitors who do not remain. The act further defines wilderness as:

“An area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed to preserve its natural conditions and that:

- Generally appears to have been affected primarily by the forces of nature with the impact of people substantially unnoticeable
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation
- Has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in unimpaired condition
- May also contain ecological, geological, or other features of scientific, educational, scenic, or historical value”



**Timbered Crater WSA**

Table 3.17-1 indicates the suitability of areas for designations as Wilderness in the AFO area, as determined in the 1990 California Statewide Wilderness Study Report (BLM 1990).

**Table 3.17-1** Suitability of Areas for Designation as Wilderness in the Alturas Field Office Area

Wilderness Study Area	WSA Size (acres)	Recommended Suitable (acres)
<b>Timbered Crater WSA (includes Baker Cypress Natural Area)</b>	<b>17,896</b>	<b>0</b>
<b>Pit River Canyon WSA</b>	<b>10,984</b>	<b>6,703</b>
<b>Tule Mountain WSA</b>	<b>16,998</b>	<b>0</b>
<b>Lava WSA</b>	<b>10,770</b>	<b>10,770</b>
<b>Total</b>	<b>56,648</b>	<b>17,473</b>

#### Pit River Canyon WSA

The Pit River Canyon encompasses a section of the Pit River and is approximately 13 miles in length with dynamic geology, wildlife, and historic values. The National Historic Lassen Emigrant Trail is located within the boundary of the WSA. A recreational fishery exists for the entire length of the canyon. No legal access exists for the public. Roseberg Resources Company, a large timber owner in the area, has intermixed lands with BLM and controls the majority of the access. The area still receives visitor use, but there is no data available to indicate the exact numbers. A large portion of the study area has been identified as suitable for inclusion into the National Wilderness System. The WSA has 10,984 total acres, of which 6,703 acres are recommended suitable for wilderness. There is an additional 740 acres of lands currently in private ownership that could be included in the WSA if the land could be acquired.

### **Lava WSA**

The Lava WSA is located in Shasta County; the northwestern corner of the WSA only 0.5 mile from the community of Fall River Mills. The WSA is an extremely rocky lava flow with no interior roads or trails, devoid of water sources except a few livestock reservoirs on the northern and eastern boundaries. The landscape is a mixture of dynamic lava reefs, islands of soil, and broken lava tubes. All areas of the interior have old growth Jeffrey/ponderosa pine, due to the lack of roads.

The area has three small wildlife guzzlers constructed by CDFG in the late 1960s, and all are located on the eastern periphery of the lava. One developed campground was located within the WSA. In 1990, all of the improvements for the campground were removed, and vehicle access into the site will be blocked. Popcorn Cave and Big Cave are both located in the southeast corner of the WSA. Each cave has over 800 feet of surveyed passages. A primitive trail was constructed from the end of the access road to Popcorn Cave in the 1960s. Both caves have been used for parties, with debris, bottles, and cans left in the caves. The Shasta Grotto, an official cave group, has cleaned up debris several times when visiting the caves. The Shasta Grotto was instrumental in the process of designating Big Cave as a significant cave under the Federal Cave Resources Protection Act. It was designated due to its length, height, width, and population of Townsend's Big Eared Bats. No precise numbers of visitor use are known. The WSA encompasses 10,770 acres of lands managed by BLM and is recommended suitable for wilderness.

### **Timbered Crater WSA**

Timbered Crater WSA is also a mixture of lava reefs, pockets of soils, broken lava tubes, brush, Jeffrey/ponderosa pine, and Baker cypress. The Baker Cypress Instant Study Area (ISA) is located in the Timbered Crater WSA and contains 1,448 acres. FLPMA directed BLM to identify and study for wilderness characteristics those areas that were formally identified as natural or primitive areas prior to November 1, 1975. These areas are referred to as ISAs. Ahjumawi Lava Springs State Park is located on the southern end of the WSA and is accessed only by water.

The area has been subject to illegal flat rock collection, and some areas still exhibit the impacts of this activity. The Shasta Trinity and Lassen National Forests manage lands adjacent to the WSA that also have been identified as having roadless characteristics; these are under further study by the USDA Forest Service. The WSA includes 17,896 acres under BLM management and is recommended for non-wilderness.

### **Tule Mountain WSA**

The Tule Mountain WSA is dominated by large expanses of big sage, juniper, and mountain mahogany. A unique stand of pine, fir, and aspen is located near the top of the mountain, on the south slope. The main feature of the WSA is Tule Mountain itself, which rises to 7,098 feet in elevation, with dynamic vistas in all directions.

Hunting activities occur throughout the appropriate seasons. The WSA has many primitive hunting camps that are generally associated with deer hunting season. Hunting activity has been decreasing in the area over the last 15 years due to the restricted number of permits allocated in X-designated mule deer hunting zones, and reduced time allocated for the seasons (X-zones are mule deer hunting areas in which the number of permits is restricted, and permit holders are selected by lottery). No numbers of visitor use are currently available. The WSA encompasses 16,998 acres under BLM management and is recommended for non-wilderness.

## 3.18 Travel Management

### 3.18.1 Off-Highway Vehicle Uses

OHV use within the field office includes motorcycles, ATVs, four-wheel drive vehicles, and snowmobiles.

OHV activity is allowed and encouraged on BLM-administered lands designated for the use and where the OHV use does not hamper attainment of land health standards.

The current designations for OHV use areas on BLM-administered lands are as follows:

- ‘Open’ areas allow for all types of vehicle use, at all times, anywhere in the area.
- ‘Limited’ areas are restricted at certain times, in certain areas, or to certain vehicle use. Examples include seasonal limitations, requirements to use only existing roads and trails, and requirements to use only designated roads and trails.
- ‘Closed’ areas are areas where OHV use is prohibited.



Unregulated OHV use

**Table 3.18-1** Existing Travel Designations in the Alturas Field Office

OHV Designation	Acres	Percent of AFO Area
‘Open’	441,077	87.7
‘Limited to Existing Roads and Trails’	38,722	7.7
‘Limited to Designated Routes’	3,260	0.6
‘Closed’	19,986	4.0
Undesignated	0	0
Total	503,045	100

Monitoring the effects of OHV use on heritage or cultural resources, soil loss on trail systems, and impacts on fish and wildlife are used to assess impacts of OHV use.

A complete route inventory was conducted for the AFO in 2004. This on-the-ground inventory—carried out by BLM staff riding or driving motorcycles, quads, and four-wheel drives and using global positioning systems—identified approximately 902 miles of routes on public land, including gravel roads, dirt roads, rough two-track four-wheel drive roads, ATV trails, and single track motorcycle trails used for various motorized activities.

The majority of OHV use occurs in conjunction with hunting. ATVs are now commonly used by many hunters to access hunting areas. Four-wheel drive pick-up trucks and Jeep-type vehicles were the primary means of access into a hunting area from the 1950s to the 1990s; however, hunters now commonly park their trucks on the primary access routes into an area, then unload their ATV and use that to travel further into a hunting area before beginning their hunting on foot. This improves their ability to travel along the rough rocky roads far into the hunting areas.

Off-route OHV cross country travel, mainly by motorcycle and ATV riders, occurs in locations that offer mineral material sites and soils acceptable for riding (usually these mineral sites are relatively small pit areas). A large part of the riding public stays on existing roads and trails, but some indiscriminate riding occurs in areas with less rocky terrain causing impacts to soil, vegetation, cultural resources, and wildlife habitat. Most of the off-road riding is occurring in the Fall River area where there are generally less rocks than on the eastern side of the field office. The Day Bench and Hogback Ridge areas are popular with local residents because of their proximity to Fall River Mills area. Riders from Redding are using the area more, as the Fall River Mills area is fairly close to Redding where many landscapes are closed or regulated due to impacts from OHVs.

The main OHV trail-riding on the east side of the field office occurs on dirt roads and single track trails in the hills to the south of Alturas and the Devils Garden area north of town. Other vehicle-based recreation activities include driving for pleasure and back road exploring in high clearance vehicles and on motorcycles and ATVs on the 902 miles of dirt road and trail network throughout the AFO area.

Snowmobile travel occurs very little in the field office due to the general lack of snow; however, the use that occurs on BLM lands is primarily at higher elevations areas such as the Deadhorse area and Nelson Corral south of Likely, and on Widow Peak, west of Bieber.

Motorized boating activities occur primarily on West Valley, Bayley, Nelson Corral, Antelope, Knox Gulch, and Lower Roberts Reservoirs, and Delta and Moon Lakes because these water bodies are large enough to accommodate and justify motorized boats. Most of this activity is associated with fishing, whereas West Valley reservoir caters to a multitude of water sports, with fishing and water skiing the primary activities. The Pit River has various segments that are used for whitewater rafting, but the primary areas are the Lower Pit River Canyon and the river near the Pit River Campground.

### 3.18.2 Non-Motorized Activities

Non-motorized activities within the AFO include hiking, mountain bike riding, cross country skiing, and horse back riding.

#### 3.18.2.1 Hiking

The primary non-motorized use within the field office is hiking, or foot travel. Hiking is usually associated with hunting the various game animals found throughout the field office. This activity is strictly tied to the hunting seasons during the fall and winter months. Some hiking is also inherent to fishing.

Hiking for the joy of hiking also occurs throughout the field office. The vast majority of this recreational pursuit occurs on the Pacific Crest Trail south of Fall River Mills, although the field office only has 2 miles of this national hiking trail on BLM land.

Other identified hiking and non-motorized opportunities in the field office are:

- Devils Garden ride, 4 miles northwest of Alturas
- Woodland Jurassic ride, 6 miles south of Alturas
- Likely Mountain Challenge, 5 miles south of Likely
- Deadhorse loop cross country skiing area, and
- Nelson Corral High country cross country skiing area.

For a different experience, WSAs managed by the AFO afford hikers a wide variety of high desert primitive hikes in a landscape dominated by volcanic peaks, rims, and ridges. The mountain peaks and ridges afford expansive and spectacular vistas across the Great Basin Desert and west to the Sierra Crest and Cascade Mountains. There are numerous canyons to explore including some with perennial streams with established fisheries.

The WSAs are:

- The Pit River Canyon has one of the most spectacular and deepest canyons in the area, with outstanding vistas of Mount Shasta.
- The Lava WSA affords excellent cross country hiking through rugged broken lava flows with intermixed islands of pine and juniper. Many locations afford outstanding views of two of the higher peaks of the Sierra and Cascade ranges – Mount Lassen and Mount Shasta.
- The Timbered Crater WSA located in the northwestern portion of the AFO jurisdiction presents challenging hiking where numerous low volcanic rims and canyons afford broad vistas across the open landscapes. Many locations afford outstanding views of two of the high peaks of the Sierra and Cascade range– Mount Lassen and Mount Shasta.
- The Tule Mt. WSA offers spectacular vistas of the eastside at 7,000 feet, coupled with high desert stands of pine and white fir.

Other key hiking locations:

- The abandoned Modoc Line railroad grade, with 85 miles of track removed in 2003 and 2004, is now a packed gravel roadbed that extends from 1.5 miles north of Wendel to 12 miles south of Alturas. This railroad grade has excellent potential for conversion to a rail trail with three segments of particular interest for hiking – near Wendel to Viewland by Highway 395, Karlo to Crest south of Ravendale and Madeline to McArthur siding north of Likely (AFO segment).

Backpacking (overnight hiking) also occurs in the above areas as well as many other portions within the field office area, but there are no developed trails of sufficient length to facilitate the sport therefore this use is sporadic and mainly associated with hunting.

Cross country skiing occurs during winter months where adequate snow provides opportunities at higher elevation areas. Two areas have been identified in brochures for winter sports in the region. The Nelson Corral High country southwest of Likely and the Deadhorse Loop southeast of Likely in the south Warner Mountains usually have sufficient snow during years with normal precipitation.

### 3.18.2.2 Mountain Biking

Mountain biking continues to gain popularity on public lands administered by the field office. Visitors from many areas inquire about biking opportunities on the three mountain bike routes, as well as seeking other areas to ride.

Notable rides within the field office:

- the Devils Garden ride, 4 miles northwest of Alturas has an abundance of trail riding opportunities and challenges, with dynamic views of Rock creek canyon
- the Woodland Jurassic ride, 6 miles south of Alturas has great views of the Warner Mountains to the east and tours through juniper woodlands

- the Likely Mountain Challenge, 5 miles south of Likely has outstanding vistas of the South Fork Pit River Valley, the Warner Mountains, and has a variety of skill levels
- The 902 miles of dirt roads and trails throughout the field office offer a variety of riding experiences over a variety landscapes for every skill level.

Presently, mountain biking does not occur on many of the roads because the roads are in remote locations, the surfaces can be very rocky, but many provide looped riding opportunities. Most riders are not aware of the many miles of riding opportunity available on public lands within the field office.

Many riders prefer rides that afford loop rides on surfaces that are not excessively rocky and in scenic settings with low to moderate elevation gain. More highly skilled and fit riders, however, seek challenging rides on narrow trails that can be very rough in places. Few single-track trails currently exist on BLM-administered land. Such trails are highly sought by mountain bikers and could become destination attractions if a quality system of looped single track trails were constructed.

BLM lands have excellent potential to provide a wide variety of new scenic trails that could be designed and constructed to meet a broad spectrum of rider interests and abilities which would capture local rider interests and attract and hold visiting mountain bikers in the area.

The trackless roadbeds of the abandoned railroad grades of the Modoc Line provide gentle grade trails that serve local riders and, as they become known, should retain area visitors that come to the area for destination mountain biking experiences.

### 3.18.2.3 Horseback Riding

Interest in recreational horseback riding within the field office continues to increase. There are horseback riding clubs in Lassen and Modoc Counties and each club conducts some rides on public lands. There area also has many equestrians who do not belong to clubs who enjoy riding on public lands for special endurance rides and recreational rides in the high desert and Intermountain country of the AFO.

### 3.18.3 Human-Powered Boating

Travel by human powered watercraft occurs on:

Bayley Reservoir	600 acres
Nelson Corral Reservoir	200 acres
West Valley Reservoir	1500 acres
Antelope Reservoir	10 acres
Knox Gulch Reservoir	15 acres
Lower Roberts Reservoir	1000 acres
Moon Lake	4,200 acres
Delta Lake	600 acres

All reservoirs and lakes are primarily used for fishing. Human powered watercrafts on these water bodies include float tubes, pontoon boats, canoes, kayaks and rowboats. Use of these types of watercraft is increasing as sports such as fly fishing are gaining in popularity.

### **3.18.4 Transportation**

Major improved transportation networks or public highways managed by counties and the California Department of Transportation in the AFO area have been established for many years. These highways and roads have been authorized by numerous Acts of Congress, including the Act of 1866 (Revised Statute [RS] 2477), FLPMA, and a wide variety of federal aid highway acts under the administration of the Federal Highway Administration.

Major roadways in the AFO area include U.S. Highway 395 and State Highways 89, 139, and 299. A limited number of improved dirt roads are maintained by the counties and BLM to provide additional area access.

Major BLM-maintained access roads in the AFO area include:

- Cinder Cone
- Tule access
- Knox Mountain
- Nelson Corral
- Antelope Reservoir

Numerous well-established casual-use roads also cross public lands in the AFO area. A comprehensive AFO route inventory and GIS were completed in 2004.

RS 2477, Section 8 of the 1866 Mining Act, granted a ROW for the construction of highways across public lands not reserved for public uses. Although RS 2477 was repealed with passage of FLPMA in 1976, highways constructed before FLPMA have valid existing rights.

RS 2477 contained no process for notifying the federal government of ROWs or for documentation in the public land records. Thus, the number and location of valid RS 2477 ROWs in the field office area is not known.

Under BLM's policies, all existing public roads, trails, and two tracks are open to public motorized use unless specifically closed for documented, specific resource protection needs. Such closures become effective upon final publication of a legal closure notice in the Federal Register.

## **3.19 Vegetation**

For this PRMP/FEIS, the vegetation component of the affected environment addresses all terrestrial and aquatic vegetation communities, special-status plants, and noxious weeds. These three vegetation resource categories are described separately in this section. Additional information that relates to vegetation resources (primarily vegetation communities) is also provided in Chapter 3.6 “Fire and Fuels,” Chapter 3.7 “Forestry,” Chapter 3.9 “Livestock Grazing”, and Chapter 3.25 “Wildlife and Fisheries”.



**Blueoak Woodland with Western Juniper & Medusahead invasion**

### **3.19.1 Vegetation Communities**

#### **Overview of Existing Conditions**

A majority of the lands administered by the AFO are located in the Modoc Plateau of the Great Basin Province, as described in The Jepson Manual (Hickman 1993). The remainder of the AFO area (i.e., the area along the western boundary) is within the Cascade Range region of the California Floristic Province. Because the AFO area is located within the transition zone between these two floristic provinces, a portion of the AFO area exhibits floristic elements of both the Great Basin and the Cascade Range foothills. In the transition zone, these elements mix, plant communities intergrade with little clear demarcation, and plant alliances become ecotonal.

The AFO does not have up-to-date information (e.g., written descriptions, GIS layers, or maps), for all of its vegetation communities. One source of vegetation data, in the form of GIS layers, available to the AFO is the CALVEG map and classification system, which describes the dominant or primary vegetation types or vegetation alliances (USDA Forest Service 1981). The CALVEG layer has only been minimally ground truthed. CALVEG is a statewide system for classifying vegetative and non-vegetative cover types. The USDA Forest Service developed the CALVEG system for use in describing and contrasting vegetation types (alliances) across the state and in mapping their general distributions. The information is typically used in land management issues such as forest-wide planning efforts, wildlife habitat mapping, and fire risk assessment.

Another source of vegetation data is the juniper canopy coverage, developed through the interpretation of contrast, brightness, and shadows of vegetation from digital orthophoto quadrangle maps by a private contractor. This source has not been validated on the ground for accuracy. Discrepancies between the juniper coverages exist because the juniper canopy cover overlaps shrub and herbaceous cover, it includes other species with a similar reflectance (Baker cypress, oaks and gray pine), and canopy cover classes below 20% are actually communities such as mountain big sagebrush and low sagebrush.

A description of the existing vegetative conditions in the AFO area corresponds with the vegetation types in CALVEG as well as the plant alliances that are used in the Vegetation Classification and Mapping Program (VCMP) (CDFG 2003). The VCMP plant alliances and corresponding plant associations are neither described nor mapped for the AFO area. They are mentioned in this document to provide the reader with the current vegetation classification scheme that will be used in the updated version of the Manual of California Vegetation, anticipated to be published in 2004/2005.

Biological crusts are often omitted from discussions of vegetation communities. Biological crusts, also known as cryptobiotic crusts, are made up of mosses, lichens, and cyanobacteria (blue-green algae). Biological soil crusts are an important source of biologically fixed nitrogen on nutrient-poor soils of the Great Basin, and they protect the fragile and sparsely vegetated soils in this region from erosion. In addition, biological crusts may reduce the invasion of weedy, nonnative annual grasses such as cheatgrass (Kaltenecker et al. 1999). Recent research by Ponzetti and McCune (2001) shows that microbiotic crusts may be indicators (e.g., an early warning system) of rangeland health. Although no relationship between total vascular cover and crust cover has been found, there is a correlation between perennial bunchgrass cover and crust cover. Work is still needed for the AFO Resources Staff to fully analyze where biological crusts occur and where they have been damaged to the extent that they need to be restored to the landscape. Absence and presence of crusts is recorded as part of the functional/structural indicator when evaluating land health status. Biological soil crusts are also included in all fire effects monitoring studies.

CALVEG mapping shows 38 vegetation alliances on AFO area lands. Table 3.19-1 shows the vegetation alliances mapped in the AFO area. Map VEG-1 shows the distribution of mapped CALVEG communities in the AFO area.

A vegetation association is a plant formation presenting a uniform gross appearance of a kind of vegetation, ignoring its taxonomic composition (Daubenmire 1968). The three vegetation associations present in the AFO area are forest/woodland association, shrub association, and herbaceous/grassland association. A vegetation community is the basic unit of vegetation (Daubenmire 1968). A vegetation community is an assemblage of vegetative species that are ecologically interrelated.

The 38 vegetation alliances, or communities, are listed in Table 3.19-1, and are summarized below.

### **3.19.2 Forest and Woodland Associations**

Fifteen communities are described within the forest and woodland association. Some of the communities are dominated by species that may assume either shrub or tree structure. They are included here because most of these species have the potential to achieve tree structure under supportive environmental situations and when seedlings or saplings are subject to limited herbivory. Sawyer and Keeler-Wolf (1995) define a tree as a woody plant with a tall final height, commonly with one stem [trunk] from the base.

CALVEG vegetation types in this association are eastside pine, Jeffrey pine, knobcone pine, and mixed conifer-fir, Baker cypress, mixed conifer-pine, gray pine, ponderosa pine, ponderosa pine–white fir, blue oak, Oregon white oak, California black oak, quaking aspen, western juniper, and white fir.

Knobcone pine and Baker cypress are restricted to the Timbered Crater WSA in the Fall River watershed. Baker cypress is a California Native Plant Society (CNPS) List 4 plant and a BLM special interest plant. Both Baker cypress and knobcone pine are fire-dependent species. Gray pine occurs primarily in the Fall River watershed but also occurs in the Dixie Valley area.

Blue oak is found in the Fall River watershed from an area along State Highway 299 above BLM's Pit River Campground, west of Saddle Mountain and extending west to Lake Britton, and south to near the town of Burney. This is the easternmost disjunct population of blue oak. Other oak species occasionally hybridize with blue oak. (The preceding three communities are not described in the CALVEG layer, but BLM recognizes their presence in the planning area.)

**Table 3.19-1** Vegetation Types and Acres Mapped in the Alturas Field Office Area

Vegetation Type Description (CALVEG)	Total Acres by Vegetation Type <sup>a</sup>	Percent of BLM Acres
Agriculture <sup>b</sup>	1,008	0.2
Annual grass/forbs	17,696	3.518
Annual grass/ medusa-head <sup>c</sup>	21,387	4.252
Baker cypress	4,246	0.844
Barren rock/lava	11,382	2.263
Birchleaf mountain mahogany	334	0.066
Bitterbrush	109	0.022
Blue oak	69	0.014
California black oak	1,615	0.321
Ceanothus mixed chaparral	9,390	1.867
Ceanothus mixed chaparral/gray pine	6,726	1.337
Curlleaf mountain mahogany	2,184	0.434
Dune <sup>b</sup>	9	0.002
Eastside pine	18,494	3.676
Greasewood/big sagebrush	441	0.088
Gray pine	738	0.147
Jeffrey pine	617	0.123
Knobcone pine	112	0.022
Low sagebrush	52,593	10.527
Low sagebrush/annual grass <sup>c</sup>	4,218	0.838
Mixed conifer – fir	4,976	0.989
Mixed conifer – pine	3,609	0.717
Montane mixed chaparral	5,368	1.067
Mountain big sagebrush	178,572	35.499
Northern basalt vernal pool	47	0.009
Oregon white oak	2,653	0.527
Ponderosa pine	266	0.053
Quaking aspen	363	0.072
Rabbitbrush	924	0.184
Riparian shrub woodland	343	0.068
Silver sagebrush	1,378	0.274
Upper montane mixed shrub	94	0.019
Water	3,691	0.734
Western juniper <sup>d</sup>	132,338	26.308
Wet meadows-grass/sedge/rush	1,619	0.322
White fir	671	0.133
Willow	5	0.001
Wyoming big sagebrush	9,080	1.805
Unknown	3,316	0.66

<sup>a</sup> Acres are rounded approximations from GIS.

<sup>b</sup> Vegetation classification in CALVEG.

<sup>c</sup> Vegetation classification adopted by Alturas BLM.

<sup>d</sup> The BLM AFO considers this value to be in error. For planning purposes the AFO will use the figure of 304,666 acres as the total acres of juniper by canopy cover.

Oregon white oak is found in the Fall River and Big Valley watersheds; the eastern extent of this type occurs in the vicinity of Round Valley and Chace Valley, near the town of Adin. This oak species occurs either as pure stands or is mixed with juniper (mostly post-settlement western juniper), eastside pine, and mixed ceanothus chaparral.

Researchers have found that oak woodlands are maintained by frequent fire. Oaks have adapted to fire by sprouting from the root crown. Low to moderate intensity and frequent fires maintained oak woodlands as an open savanna. Fires reduced shrubby oaks and removed invading conifers. All the oak woodlands of the AFO are under the Direct Protection Area of the California Department of Forestry and Fire Protection (CDF). The CDF actively suppresses all wildfires in areas of oak woodlands on public lands administered by BLM. The reintroduction of fire is needed to enhance oak regeneration, encourage sprouting of young trees, saplings and sprouts, to reduce annual insects that predate on acorns and seedlings, to reduce annual grass invasions, and to reduce conifer encroachment. In addition, exotic annual grasses compete for water and light and rodent and other ungulate herbivory is negatively impacting oak regeneration.

The remaining forest and woodland communities are found throughout the AFO area. Eastside pine is primarily an eastern community but enters the Fall River watershed in Muck Valley (it was misrepresented on the CALVEG layer). Mixed conifer-fir and mixed conifer-pine occur primarily in areas with cool soil temperature regimes; these areas receive significant snow pack.

### **3.19.2.1 Juniper Woodland Communities**

According to the juniper canopy cover layer for the AFO, there are 304,666 acres of juniper woodlands (again, this is by canopy cover class of juniper). As mapped by CALVEG, there are approximately 132,338 acres of juniper woodlands on BLM-administered lands in the AFO area. The actual acreage is somewhere between these values.

The juniper acreage includes old growth, juniper sagebrush associations, various seral stages of juniper woodland, mixed juniper-gray pine-Oregon white oak associations, and other shrub communities that are in a state of transition or have crossed a threshold to juniper or juniper/annual grass dominated communities. Old growth juniper is estimated to be between 34,000 and 182,000 acres, probably closer to the former. A description of the juniper woodland ecology is provided below.

Juniper woodlands have large ecological amplitudes and occupy a variety of parent materials, soils, topographic positions, and climates. This woodland community can occupy and dominate many different plant cover types. Adding to the spatial complexity of these woodlands are their temporal dynamics. Many juniper woodlands are in various stages of succession from early to late development. The stage of woodland development affects fuel loads, wildlife habitat, management operations, cost of conversion, and response to treatment (Miller, Svejcar, and Rose 1999). This overview also applies to the sagebrush steppe (shrub associations, below), as many of these communities have been converted to juniper dominated woodlands and/or annual grassland associations or are at an ecological state of transition that when a disturbance occurs, a threshold will be crossed. This overview will also complement the Fire and Fuels and Terrestrial and Aquatic Wildlife sections.

There has been an increase in both the distribution and density of juniper across the Intermountain West, starting in the late 1800s. Juniper has encroached into sagebrush steppe communities (mostly deeper, well drained soils with mountain big sagebrush), since the onset of European settlement.

Livestock grazing, fire suppression, and climate are the factors most frequently implicated in this historic expansion of juniper throughout the western U.S. As trees gain dominance and shrubs and herbaceous vegetation decline, fuel structure changes, which contributes to significant increases in the length of mean fire return intervals (MFRI)—(historically, 12–25 years; now greater than 100 years). Dense tree-canopied woodlands are now becoming susceptible to intense crown fires. The intensity of these fires can lead to dominance by exotics, further altering the successional dynamics of the site (Karl and Leonard 1996; Miller and Tausch 2001).

As sagebrush steppe and woodland successional stages have changed, their susceptibility to fire and the types of fire has changed (Tausch 1999a). Many studies indicate that a fine fuel component was necessary to maintain sagebrush communities. Seral communities were maintained by wildfires and with the change in structure and herbaceous layer the fire regimes have changed. Gruell (1999) describes how fires were frequent on deep soils that produced an abundance of fine fuels but infrequent on shallow soils and rocky sites. Big sagebrush/perennial grass communities burned frequently in mosaics thereby preventing tree encroachment. Low sagebrush sites burned infrequently (MFRI of 100+ years) and at low intensities, so juniper trees were able to persist on these sites.

Grazing and fire suppression have resulted in a shift from low intensity, frequent fires to high intensity, infrequent fires. This increased canopy cover and density of juniper, a buildup of woody fuels, and a decrease in the amount of fine fuels with an increase in fine fuel continuity (cheatgrass), it is apparent that the current and future situation will be one of continued high intensity wildfires as well as an increase in their frequency and magnitude (Gruell 1999, Whisenant 1990).

In the past, federal agencies had treated juniper woodlands to control their expansion, mostly for livestock forage; these efforts peaked from the 1950s to the late 1960s. However, wildlife and environmental concerns, and different perceptions of the intrinsic values of these environments recently have limited treatment of woodlands, including the use of prescribed fire. During the early to middle stages of development, when these woodlands contain understories of native shrubs and herbs, they can successfully be treated by various methods—particularly fire. However, once communities become tree-dominated woodlands, treatment becomes difficult and expensive (Miller and Tausch 2001). Currently, land management agencies and private interests in NE California are embarking on a sagebrush steppe restoration strategy to improve the health and productivity of rangelands that have been encroached upon by western juniper. A separate EIS is being prepared.

Factors most frequently attributed to the increase in both density and area of juniper are fire suppression, changes in climate, increased domestic grazing integrated with changed fire regimes, and post-industrial increases in atmospheric carbon dioxide (CO<sub>2</sub>). Fire is considered to be the most important factor in maintaining shrub steppe communities and open juniper savannas prior to Eurasian settlement. A wet period, from 1850 to 1916, with milder temperature and greater precipitation coincided with the peak period of woodland establishment in the much of the Great Basin. The introduction of livestock during the 1860s through the early 1900s also coincided with the expansion of juniper woodlands. Grazing reduces the fine fuel loads that significantly altered the fire regime. With fewer natural fires, there was an increase in shrub density and cover that provided a greater number of sites for tree establishment. Rising levels of CO<sub>2</sub> have also been cited as causing the increase in woody species throughout the West. However, increased levels of CO<sub>2</sub> do not correspond with the initial increases in juniper woodland. It may be that elevated CO<sub>2</sub> levels are accelerating canopy expansion of juniper woodlands (Miller and Tausch 2001).

Old growth juniper woodlands are little understood. Miller, Tausch, and Waichler (1999) said the forestry, rangeland and ecology communities overlook the semi-arid old-growth woodlands. These ancient woodlands have some of the oldest trees in the Intermountain region, some exceeding 1,000 years.

Old growth woodlands are typically structurally more complex than post settlement woodlands adding biological diversity to the landscape and providing an important source of habitat for many organisms. Pre-settlement junipers are found on rocky ridges and low sagebrush tablelands. Canopy cover in these areas may reach as high as 20% but usually ranges below 5%. Mean fire return intervals of 80 to 100 years, together with heavy clay soils, slow growth rates, and possibly lower CO<sub>2</sub> concentrations in the low sagebrush/Sandberg's bluegrass communities were probably responsible for maintaining stands of widely scattered trees.

Management actions and fire policies could greatly alter old growth juniper woodlands in the AFO. Predicted post-disturbance successional trajectories are not well understood or used in managing old growth woodlands. Changes to the overstory and/or the understory, changes to the community composition and structure (this includes lichen communities), and the outcome of a disturbance, can alter the response of these communities (as well as seral juniper woodlands), to fire. Fire suppression may increase the potential for stand replacement fires. Fuel wood cutting on one hand may be a waste of this limited resource but may be needed to remove post settlement trees. Mapping and inventory of old growth woodlands (such as the proposed ACEC/RNAs) would be needed for developing management plans.

### **3.19.2.2 Aspen Communities**

The quaking aspen communities included in woodland and forest types are also associated with riparian areas (see "Wetland and Riparian Communities"); the non-riparian or upland sites are found in areas that receive significant snowmelt. The latter are more common on the Modoc National Forest in the Warner Mountains. Aspen is one of the primary woodland species of concern for the AFO. Aspen is the most widely distributed tree in North America. Aspen is adapted to a much broader range of environments than most plants found associated with it and is one of the few plants able to grow in all mountain vegetation zones, from subalpine tundra to the basal plains (Daubenmire 1943). In the western U.S., aspen forms extensive forests, is found in scattered groves or small stands on suitable sites, or it is confined to riparian areas in drier climates. In the AFO area, aspens are found in scattered groves where soils, aspect, and climate create suitable habitat. The ongoing aspen delineation project has mapped existing aspen stands (updated December 2004), at 385 acres. Aspen landscapes provide forage for livestock and wildlife, habitat for wildlife, watershed protection, and water yield for downstream users, aesthetics, and sites for recreational opportunities, historical significance (silvaglyphs), and landscape diversity. Many aspen stands occur as pure clones but aspen is generally considered a seral species, successional to conifers and sagebrush (Sheppard 1996).

Aspens usually regenerate vegetatively through root suckers. Generally, disturbance or dieback is necessary to stimulate regeneration of aspen stands. Without periodic disturbance to kill old stems and trigger regeneration, aspens eventually disappear from the landscape. Some clones sucker without disturbance. Throughout the western U.S., approximately 60% of historical aspen stands have been eliminated since European settlement (in the past 150 years) (Bartos and Campbell 1998). Loss can be attributed to a combination of successional processes, reduction (or elimination) of fire, and long-term overuse by ungulates (hoofed mammals). If these current processes continue, aspens will be replaced by conifers, sagebrush, or other shrub communities (Bartos 1998). These processes are present in the AFO area, with aspen clones declining and dying—or moving toward a late successional stage with no young stem or suckers.

### 3.19.2.3 Curleaf Mountain Mahogany Communities

Although curleaf mountain mahogany (or mahogany) is technically a shrub, it matures into a tree-like form, and stands of curleaf mountain mahogany are called woodlands. Mahogany is widely spread in the mountain brush zone of the Intermountain West. It usually occurs on shallow soils or dry, rocky ridges of all aspects, but is primarily found on southern or western exposures. In the AFO area, it can be found in association with rock outcrops in talus slopes, hilltops, and mountain tops and lava flows. Mahogany often occurs as pure stands, as groves surrounded by open sagebrush, or mixed with other shrub species (snowberry, service berry, and currant), western juniper, Jeffrey pine, and—in higher elevations—white fir.

Its presence in less rocky settings suggests that mahogany precedes conifers in succession, but these communities, however, tend to be stable or climax in nature (Davis and Brotherson 1991). It is somewhat shade tolerant. Mahogany is adapted to a wide range of soil textures, but is most abundant in dry, coarse-textured soils.

Mahogany provides good forage for all classes of browsing animals in both summer and winter; it is one of the few browse species that meets or exceeds the protein requirements for wintering big game animals. In mature stands, much of the mahogany foliage is out of reach of browsing animals but provides excellent winter cover. Also, because it fixes nitrogen, curleaf mountain mahogany increases nitrogen levels in the nutrient-poor soils where it grows.

The ecotonal areas with juniper or Jeffrey pine often are occupied or are considered potential habitat for the special interest plant, Baker's globemallow (*Iliamna bakeri*). Many of the stands of mahogany in the AFO area are dominated by older individuals—trees with crowns that are nearly unreachable by wildlife. Ages of plants or stands vary. Davis and Brotherson (1991) found trees between 48 and 143 years old and they cited other studies where older trees were aged between 130 and 482 years. Older trees in western and central Nevada are up to 1,800 years old (Schultz, et.al. 1990). Basal crowns of individual trees in the AFO area have been observed up to 24 inches in diameter, where trees are growing in protected rock outcrops. It is estimated that these individuals are hundreds of years old.

Seedling presence varies throughout the AFO area—some stands have numerous seedlings, some have none. Studies have found that the greatest numbers of seeds of mahogany are found immediately under and in the litter of mature plants (Ibáñez et al. 1999). The greatest number of seedlings, however, has been found in the open interspaces and under sagebrush canopies; open canopies of curleaf mountain mahogany are necessary for seedling survival (Ibáñez et al. 1999). Many of the mahogany stands provide the only source of shade for livestock (and deer), and these areas and the surrounding sagebrush (usually mountain big sagebrush) have been subjected to heavy grazing pressure. Some stands are being invaded by cheatgrass and noxious weeds, which apparently suppress seedling survival. The decadent condition of existing stands, lack of or poor recruitment, heavy ungulate pressure, juniper encroachment, and altered fire regimes leave many of the mahogany stands in the AFO area at risk.

### 3.19.3 Shrub Associations

A large number of shrub types have been identified in the AFO area. Shrubs are defined by Sawyer and Keeler-Wolf (1995) as woody plants with relatively short ultimate height, commonly with two or more stems from the base. There are at least 17 shrub community types identified in the AFO area.

Shrub vegetation types identified by CALVEG and AFO staff include birchleaf mountain mahogany, bitterbrush, black or Bailey's greasewood, Brewer's oak, basin big sagebrush, ceanothus mixed chaparral, greenleaf manzanita, Great Basin mixed scrub, low sagebrush, montane mixed chaparral, mountain big sagebrush, rabbitbrush, riparian shrub woodland, Bolander silver sagebrush, upper montane mixed shrub, wedgeleaf ceanothus, willow, and Wyoming big sagebrush.

Black greasewood is localized and found on BLM lands adjacent to the Lower Klamath NWR. It is also found on Modoc NWR lands south of Alturas and on private lands between Alturas and Canby. Greasewood is associated with basin big sagebrush in these areas.

Bitterbrush and rabbitbrush are found throughout the AFO area. Bitterbrush, which is underestimated on the CALVEG layer, is usually associated with mountain big sagebrush communities, commonly growing with snowberry at the higher elevations.

Bitterbrush stands are becoming decadent in many areas (i.e., most watersheds) due to fire suppression, season-long or fall grazing, and insect damage. Rabbitbrush is primarily a successional community, occurring after disturbances such as wildfires. There are silty clay sites with Washoe common rabbitbrush (*Ericameria nauseosa* var. *washoensis*), that are found within low sagebrush communities. These Washoe rabbitbrush/Cusick's sunflower associations are mostly devoid of vegetation and prone to medusahead invasion.

There is another plant that forms an undescribed plant association in the North Fork/South Fork watershed which is desert peach (*Peraphyllum ramosissimum*). Desert peach is either dominant or co-dominant with mountain big or Wyoming big sagebrush. Desert peach is known to occur south of Alturas on the Westside grazing allotment and on the Likely Tablelands. The Westside occurrence is heavily impacted by browsing and grazing and the Wyoming big sagebrush-desert peach associations on the Tablelands are impacted by browsing, grazing, and exotic annual grass encroachment. The MFRI is unknown but the existing one on the Tablelands is about 10 years.

Ceanothus mixed chaparral, Brewer's oak, and wedgeleaf ceanothus occur primarily in the Fall River watershed. These communities intergrade into each other and mix with sagebrush, oak, and pine communities. Greenleaf manzanita, deerbrush, snowbrush, and montane mixed chaparral are mostly higher-elevation communities of cooler soil temperature regimes; they are ecotonal with mixed conifer and pine. Both deerbrush and snowbrush are localized communities that could actually be a part of the montane mixed shrub community. Birchleaf mountain mahogany occurs primarily in the Fall River watershed in either pure stands or with Brewer's oak and wedgeleaf ceanothus. Greenleaf manzanita also occurs at lower elevations (3,000 feet and up) and is mixed with ceanothus mixed chaparral, skunkbush, and gray pine.

### 3.19.3.1 Sagebrush Steppe

The AFO has the following sagebrush species: basin big sagebrush, Wyoming big sagebrush, mountain big sagebrush, low sagebrush (2 subspecies), and Bolander silver sagebrush. Other shrub species that occur as dominants or co-dominants are snowberry, service berry, snowbrush (tobacco brush), greenleaf manzanita, mahala mat, rubber rabbitbrush, antelope bitterbrush, and gray horsebrush. In burned areas on suitable sites the Sensitive plant Baker's globemallow can be very common.

Each of the sagebrush species forms distinct plant alliances with various plant associations. A critical data gap in CALVEG is the failure to divide basin sagebrush into basin big sagebrush (*Artemisia tridentata* spp. *tridentata*), Wyoming big sagebrush (*A. tridentata* spp. *wyomingensis*), and mountain big sagebrush (*A. tridentata* spp. *vaseyana*).

The Great Basin mixed scrub alliance is also represented in the AFO area, although none of the plant associations are mapped. This community occurs either at higher elevations (McDonald Mtn., Tule Mtn., and Anderson Mtn.) or in transition to conifer or pine forests.

### **3.19.3.2 Basin Big Sagebrush**

Basin big sagebrush is found on deep, well-drained loamy or sandy soils below about 5,000 feet. It is an erect, heavily branched, unevenly topped shrub with a trunk-like main stem. Shrubs are 3 to 6 feet high, but can reach heights of 15 feet. The presence of this subspecies has generally been considered indicative of productive ranges because it often grows in deep, fertile soil. Basin big sagebrush was once the most abundant shrub in North America on lowland ranges, which have since been converted to agriculture (Blaisdell et al. 1982). It is found on somewhat alkaline soils with greasewood adjacent to the Lower Klamath NWR and on toe slopes above valley bottoms and old floodplains south of Alturas. This subspecies is not mapped and its acreage is unknown.

Adult basin big sagebrush plants are killed by fires, but the prolific seed production from nearby unburned plants together with high germination rates enable seedlings to establish rapidly after fire (BLM 2002). The rate of recovery depends on the season of the burn but Blaisdell et al. (1990) estimates it may require up to 50 years. Site recovery and the presence of annuals will influence recovery. The MFRIs are intermediate between mountain big sagebrush and Wyoming big sagebrush. Fire history studies are few for basin big sagebrush. Although these communities probably had a mixed severity fire regime, they usually had stand replacing fires.

Stands in which the understory has been overgrazed to the extent that the perennial grass understory is lost are highly vulnerable to invasion by annual grass and to crossing the threshold to an annual grass-dominated community. Where juniper has encroached on nearby, steeper mountain big sagebrush communities, livestock tend to congregate in the flat basin big sagebrush areas. Basin big sagebrush stands with a cheatgrass understory can have fire frequencies of 5 years.

### **3.19.3.3 Wyoming Big Sagebrush**

Wyoming big sagebrush is only known to occur on the lower bench of the Likely Tablelands, primarily on moderately deep, well drained, clay loam, cobbly clay, and gravelly loam soils between 4,500 and 4,700 feet. Wyoming big sagebrush is the shortest of the big sagebrushes normally ranging in height from 2 to 4 feet. It is a basally branched, uneven topped shrub with a canopy cover of 5 to 25%, the latter in communities that have been overgrazed or are in poor ecological condition (Miller and Eddleman 2001).

Wyoming big sagebrush is readily killed by fire but reestablishes from seedbanks, seeds produced by remnant plants, and seeds from adjacent plants. Because fuels are discontinuous in undisturbed Wyoming big sagebrush communities, mosaic burn patterns often prevail, leaving remnant plants that provide seed for recolonization (Bushey 1987). Postfire establishment of Wyoming big sagebrush has not been widely documented. Kitchen (2004) estimates it takes 25 to 45 years for stand recovery. Due to topographic, edaphic, and climatic variabilities as well as seed production and dispersal patterns (Kitchen 2004), it may take 60 to 100 years for Wyoming big sagebrush to recover on burned sites even under favorable conditions. The normal MFRI ranges from 50 to 70 years (FEIS), although Young and Evans (1989) estimate it to be between 10 and 110 years.

Wyoming big sagebrush, like other big sagebrushes, lacks specialized adaptations to survive fire or to insure rapid recolonization of burned landscapes; consequently sagebrush mortality is high and recovery slow following wildfires (Kitchen 2004).

Unburned patches and edges were probably very important in allowing reestablishment of sagebrush since seed dissemination is limited to several meters from parent plants (Miller and Eddleman 2001). Because Wyoming big sagebrush occupies drier soils and sites, historical overgrazing has easily removed much of the perennial grass understory on the Likely Tablelands. Following the removal of perennial grasses, cheatgrass easily invaded the understory.

Miller and Eddleman (2001) point out that Wyoming big sagebrush communities (and basin big sagebrush), are susceptible to exotic annual invasion. Beginning in the 1960s, medusahead replaced cheatgrass as the primary invader in the AFO area. With a medusahead understory, Wyoming big sagebrush was highly susceptible to increased fire frequency (MFRI is presently about 10 years), resulting in further medusahead domination of sites and the alteration of Wyoming big sagebrush communities to annual grass-dominated communities (Young 1992).

Wyoming big sagebrush and low sagebrush communities on the Likely Tablelands south of Alturas are being converted to medusahead grasslands. This is a matter of concern because some wildlife biologists feel the Likely Tablelands are one of the most critical wildlife habitats in the state of California, primarily because of critical sage-grouse and pronghorn habitat.

Wildfires on similar sites in Idaho not only have resulted in a reduction in shrub cover but also resulted in substantially reduced diversity and richness of crust taxa, increased cover of short mosses, and reduced cover of lichens and tall mosses growing on the shrub hummocks.

Bare ground is often inversely related to crust cover, which could mean that a decline in crust cover produces an increase in bare soil, rather than an increase in vascular vegetation (Kaltenecker et al. 1999; Leonard et al. 1995). It has been observed that medusahead quickly invades the bare clay soils on the Tablelands after wildfire.

Overgrazing and erosion, self-perpetuating medusahead invasion and large accumulations of litter, differential grazing of perennial grasses in medusahead-dominated pastures, removal of the microbiotic crusts, and increased fire frequency and subsequent loss of shrubs has also resulted in a loss of the subaerially deposited loam surface layers. The subsurface layers of clay are now exposed and the soils are suspected to have converted to Vertisols, with dramatically increased shrinking, swelling, and cracking. These sites are prone to more medusahead invasion and moisture is not available to native perennial seeds due to very high matric potential of the soils (Young 1992; Blank, personal communication 1995).

During heavy fire years in the West, desired seed species for rehabilitation or restoration are often limited or not available. A program is being explored with the local Natural Resources and Conservation Service, the Resource Conservation District, and BLM to collect, plant, and grow native seed to produce a seed bank of locally adapted plant species that would facilitate future seed planning programs for medusahead restoration efforts.

### **3.19.3.4 Mountain Big Sagebrush**

The CALVEG layer shows over 178,000 acres of mountain big sagebrush occurring in the AFO area. This acreage is probably lower due to CALVEG underestimations of curl leaf mountain mahogany, antelope bitterbrush, Great Basin mixed scrub, perennial and annual grasslands, mixed eastside pine/sagebrush, and in the Fall River watershed, ceanothus mixed chaparral. Mountain big sagebrush occurs on deep, well drained soils above 3,500 feet. It is a spreading even-topped shrub that grows from 2 to 6 feet tall.

As discussed under Wyoming big sagebrush, mountain big sagebrush is not very adapted to fire—highest flammability of the 3 big sagebrushes, relatively low growth form, seeds developed at the end of the growing season, no mechanism for long distance seed dispersal, and a soil seed bank that is ephemeral or absent.

Estimates of recovery from fire vary from 20 years (Bunting et al. 1987), and 25 years (Kitchen 2004) to 30 years or more on severe burns (BLM 2002).

The average MFRI is 11 to 25 years (Miller and Tausch 2001). On good condition and upper elevation (mesic) sites, burns are usually discontinuous so the reestablishment is relatively rapid.

Adjacent unburned stands, fire-stimulated soil stored seed, suitable soil moisture conditions, and reduction of bunchgrasses all contribute to reestablishment after fire (BLM 2002). Staff from the AFO observed seedlings sprouting one month after the 2001 Blue Fire at an elevation of 6,800 feet.

As discussed under the juniper woodlands section, overgrazing and subsequent reduced herbaceous layers, a wet climate from 1870 to 1916, increased CO<sub>2</sub> levels, increased seed dissemination of juniper and other unknown factors, increases in MFRIs and past fire suppression have contributed to a reduction in the range of mountain big sagebrush and an increase in western juniper. See juniper woodland section for further discussion.

Huber et al. (1999) found that when juniper canopy cover is below 20%, understory plant diversity and species richness is high enough to cause rapid recovery from fire. At 20-30% canopy cover, the understory begins to decline and response to fire is slower. At a canopy cover in excess of 50%, understory species are mostly removed from the site and invasive exotics easily invade. A threshold to a new state has been reached. Miller et al. (2000), however, concluded the influence of juniper canopy cover on understory diversity depends on the site conditions.

### 3.19.3.5 Low Sagebrush

In the AFO area, low sagebrush occurs from an elevation of 3,260 feet, south of Fall River Mills, to near 7,000 feet on Tule Mountain south of Likely. The Fall River Mills occurrences are on shallow clay loams and are associated with Oregon white oak, juniper, and wedgeleaf ceanothus. The high elevation occurrences are associated with perennial grasses and forbs, microbiotic crusts, and where conditions allow bitterbrush and pre-settlement juniper.

There are two subspecies in the Field Office area, low, or gray low, sagebrush (*Artemisia arbuscula* ssp. *arbuscula*) and cleftleaf sagebrush (*A. arbuscula* ssp. *thermopola*). Low sagebrush is generally a spreading, irregularly branched shrub up to 20 inches tall growing on dry, sterile, rocky, clayey, often alkaline soils (Blaisdell et al. 1982). Typical low sagebrush is found on harsh, infertile shallow, gravelly, calcic soils growing about 4 to 20 inches high. It can grow at higher elevations than cleftleaf. Cleftleaf sagebrush often grows on dry, shallow, infertile, non-calcic soils in valleys, on benches or ridgetops from 6 to 12 inches high (Blaisdell et al. 1982; BLM 2002). It is only known from Big Valley at an elevation of 4,700 feet. Both subspecies grow on soils that are 8 to 16 inches deep underlain by a hardpan, claypan, or bedrock.

The low sagebrushes are readily killed by fire and do not resprout. Recovery may take up to 10 years after fire. Because of significant amounts of rock, usually bare soil, and depauperate understory—low, fine fuel loading—these communities seldom burn (BLM 2002; FEIS 2004). Miller and Tausch (2001) estimate the MFRIs range from 90 to 200 years. Fires will occur on more mesic sites or where above average productivity results in increased herbaceous growth.

Overgrazing and other unknown factors have caused cheatgrass and medusahead to invade low sagebrush communities, particularly sites with heavy clays. Medusahead is a serious problem on low sagebrush and Wyoming sagebrush ranges.

Japanese brome is a common, codominant exotic annual grass in the Fall River Mills watershed. Low sagebrush, wedgeleaf ceanothus, blue oak, and Oregon white oak rangelands in the Fall River watershed are becoming dominated by medusahead.

Some communities, however, seem to be transitioning to a low sagebrush/bulbous bluegrass/moss association; droughts appear to favor these communities and reduce the density of medusahead.

Low sagebrush communities on the Beaver Creek rim, in Dixie Valley, throughout Big Valley, the lower slopes (north aspect) of the Tule Mountain WSA, tablelands or mesas on both sides of the South Fork of the Pit River and lower elevation slopes from Alturas to Davis Creek are either set to cross a threshold or have already type converted to medusahead dominated communities.

The MFRI on most of the medusahead-dominated communities, especially the Likely Tablelands, is estimated to be 10 to 15 years. Infested low sagebrush communities on the Beaver Creek rim and Likely Tablelands are critical pronghorn habitat. Dr. Young (1992) said medusahead is probably the greatest threat to biodiversity of the natural vegetation in the Great Basin.

### 3.19.3.6 Silver Sagebrush

Bolander silver sagebrush (*Artemisia cana* ssp. *bolanderi*) communities in the AFO are associated with small, somewhat alkaline playas (pluvial lakes) and meadows with a water table within 3 feet of the soil surface. Where it is associated with dry meadows, it can become an invader of floodplains that have been overgrazed; stream channels in these areas are many times deeply incised. Not all the silver sagebrush communities in the AFO are mapped.

Silver sagebrush is an erect, spreading, much-branched shrub 8 to 36 inches tall that sprouts from roots and stem layers. It is found on deep to moderately deep sandy or silt loam to extremely clayey, alkaline soils (BLM 2002). Bolander silver sagebrush tolerates seasonal inundation. Common associates are bluegrass (locally called Nevada bluegrass) and mat muhly. With overgrazing, the native perennial plants are significantly decreased and the interspaces become nearly bare.

Silver sagebrush sprouts vigorously from root crowns and rhizomes following top kill fires. Recovery is rapid, from 2 to 3 years. The ability of Bolander silver sagebrush stands to burn is low because of seasonally high water tables. Fire history studies for Bolander silver sagebrush are lacking. The MFRI for the other silver sagebrushes is 5 to 45 years.

Because certain disturbances affect each of the shrub vegetation types in approximately the same way, they are addressed here. Disturbance means the occurrence of a significant change in the resource base (i.e., an alteration of the plant community away from a stable state, and a compositional change in both plant species and life histories). The key functional elements of any disturbance are its timing (seasonality), intensity (resource loss), abiotic resources available (water and nutrients), biotic resources available (species and their attributes), frequency (recovery interval between disturbances), and regime (connectivity to other disturbances in time and space) (Sousa 1984).

Grazing and fire tend to raise issues surrounding ecological uncertainty: whether these disturbances will produce a feedback that enforces the stability of the present community or whether they will promote transitions to a more or less desired community. Given the present state of the sagebrush steppe ecosystem, key questions center on how to influence sagebrush communities through the presence or absence of grazing and fire.

The effects on vegetation and soils caused by overgrazing, high-frequency fires, and other factors (such as uncontrolled OHV use) may be rather obvious (Blaisdell et al. 1982, Bunting et al. 1987, Vavra et al. 1994). Less obvious are the effects on other biota.

Judicious grazing practices and prescribed fires are associated with varying degrees of uncertainty regarding short-term and long-term outcomes. These degrees of uncertainty can be expected because the key functional elements of disturbance vary widely through time. Further, in the presence of a highly variable climate, they function as a disturbance regime rather than as independent events (Eddleman and Doescher 1999).

A change in the MFRIs of sagebrush communities now dominated by juniper has been discussed above. The mountain big sagebrush communities and, depending on site conditions, low sagebrush communities, have crossed a threshold to a new stable state, a state with juniper as the new dominant species. The ecological condition or state of these communities (i.e., plant composition or community structure) transitions through various stages (McAdoo et al. 1993; Pellant 1996; Tausch 1999b). Basin and Wyoming big and low sagebrush are also in various stages of transitions and in some cases these are set by the presence of exotic annual grasses that share the understory with perennials. When disturbances such as fires occur, a threshold is crossed (the change has been activated), and a new state is reached, one with annual grasses as the dominant species. The change in MFRIs is almost opposite to what occurred in the mountain big sagebrush, it has been drastically reduced. Cheatgrass and medusahead have increased the frequency and type of fire.

While mountain big sagebrush, riparian, and aspen communities have been replaced by juniper due to the reduced occurrence of fire (Miller and Tausch 2001), basin big sagebrush, Wyoming big sagebrush, and at least in the AFO area, low sagebrush communities have been replaced by exotic annual grasses due to the increased occurrence of fire.

Management actions authorized or implemented by BLM would influence future vegetation composition. These actions may include season, intensity, and duration of livestock grazing within diverse vegetation communities, the influence of fire and associated suppression actions, emergency fire rehabilitation and the reintroduction of grazing following fire, the use of natural and management-created firebreaks to protect early seral communities from frequent fire intervals, rehabilitation and reclamation actions following soil-disturbing activities, management of noxious weeds, OHV use, wild horse management, recreational use, and mining. Aggressive suppression response to wildfires, prescribed fire, vegetation manipulation, increased fire frequency in exotic annual grasslands, livestock grazing practices not in compliance with land health standards, juniper and exotic annual grass encroachment into plant communities at risk, and other environmental or unknown factors will largely determine the future composition of vegetation communities.

### 3.19.4 Herbaceous and Grassland Associations

Herbaceous plants lack woody stems above ground; may be annual or perennial; and include aquatic species, forbs, and grasses (Sawyer and Keeler-Wolf 1995). Normally, herbaceous vegetation is treated as the lowest structure of an understory to trees or shrubs. In this document, the herbaceous types and communities discussed constitute the overstory or compose the dominant structure of the stand.

Most native herbaceous species found on the Modoc Plateau and in the Great Basin are capable of withstanding fire effects unless the fire burns very hot and kills the grass at both crown and roots. Herbivory by livestock and wild horses and burros, if not properly managed, over utilizes herbaceous plants, resulting in their removal from the stand. This adverse effect can result in replacement of native perennial herbaceous species with invasive annuals. Although effects of OHV use in herbaceous-dominated communities can be minimal, constant travel on the same tracks can remove the vegetation—creating susceptibility to erosion as well as to invasion of nonnative annual species.

Most native herbaceous species found on the Modoc Plateau and in the Great Basin are capable of withstanding fire effects unless the fire burns very hot and kills the grass at the crown and roots.

Herbivory by livestock and wild horses and burros, if not properly managed, can overuse herbaceous plants, resulting in their removal from the stand. This adverse impact can result in replacement of native perennial herbaceous species with invasive annuals. OHV use in herbaceous-dominated communities can be negligible; however, constant travel on identical tracks can remove the vegetation, creating opportunities for erosion or for invasive annuals to move into the site.

The persistence of exotic annual grasses (primarily medusahead and cheatgrass) is expected to continue, regardless of whether livestock grazing occurs. This persistence is due primarily to the ability of annual plants to produce seed every year, store many years of seed in surface litter and soil, and germinate earlier than the remaining perennial plants. The invasion and dominance of annuals was accelerated by the loss or reduction of native perennial bunchgrass/shrub communities. Many factors contributed to the introduction of annuals, but frequent wildfire and previous intensive livestock grazing (both cattle and sheep) have been the primary causes. Sheep were the primary carrier of medusa-head in the AFO area; the primary expansion began in the 1960s.

The experience of BLM technical staff indicates that annuals will persist, but that it is possible to slow or reduce their spread by applying intensive grazing management techniques in the surrounding areas. These include tightly controlled livestock grazing, prescribed fire, and seeding of native plants—coupled with full suppression of high-intensity wildfires—can slow, and in some cases reverse, type-conversion to exotic annual grasslands. Grazing management techniques would include short duration, high intensity grazing. This would be accomplished with the construction of small pastures, viable livestock watering facilities, and close monitoring by BLM staff. BLM staff members have focused their efforts on designing a grazing strategy that recognizes areas where annuals dominate a plant community or site, as well as areas where annuals are a minor component. Improvement has been observed in both situations, evidenced by increased vigor and seed production of native perennial plants.

BLM has prioritized its efforts by stabilizing and improving the native plants that surround disturbed areas. Improvement in surrounding areas has created a natural barrier that has slowed the spread of annuals. BLM recognizes that many past and present factors stimulate and retard the spread of annuals, but efforts appear to have had some positive influence.

Herbaceous and grassland communities occur on BLM-administered lands in the AFO area. The seasonally dry meadows and meadow and seep communities are described under “Wetland and Riparian Associations.”

CALVEG herbaceous and grassland communities include barren/rock, annual grass/forbs, and perennial grass/forbs communities.

The barren/rock community includes exposed bedrock, lava outcrops, bare ground, and sites with very to extremely shallow soils and little organic matter. These types are found in the forest and woodland, shrub, and herbaceous and grassland associations.

Annual grass/forbs include communities where annual forbs are dominant; *Vulpia* spp. is the dominant annual grass in those communities dominated by native species. Where exotic species dominate in herbaceous and grassland associations, they consist of three species: medusahead, cheatgrass, and Japanese brome. Where these grasses have invaded herbaceous and grassland, low sagebrush, basin big sagebrush, Wyoming big sagebrush, and mountain big sagebrush communities, the normal fire return intervals have been altered and the composition, structure, and dynamics of these communities are now changed (see the affected environment discussion for fire and fuels). Most of what CALVEG has mapped as annual grass/forbs is actually nonnative exotic grasses.

Perennial grass/forb communities have either been replaced by mountain big sagebrush or rabbitbrush due to absence of fire (suppression), type conversion, past heavy season-long grazing, or relatively recent cheatgrass invasion. The largest stand is located on Cold Springs Mountain. Pure stands larger than 100 acres are rare but do occur.

### 3.19.5 Wetland and Riparian Associations

Riparian and wetland communities generally occur along the edges and within creeks, lakes/playas, and irrigation canals. Due to their proximity to water, the plant species present in riparian areas are different from species found in the adjacent uplands. They can tolerate wet or saturated soil conditions that upland plants cannot. These communities can include marshes, swamps, lakeshores, wet meadows, estuaries, and springs or seeps.

Nationwide, riparian–wetland areas comprise less than 9% of the total land base but are the most productive and highly prized resources on BLM-managed public lands. Riparian–wetland areas play a significant role in restoring and maintaining the chemical, physical, and biological integrity of the nation's water. Wildlife species use riparian areas proportionately more than any other type of habitat. In addition, riparian areas are highly prized for their economic values and other uses, which include livestock grazing, various recreational uses (e.g., hiking, fishing, photography, biking, and OHV use), Native American cultural uses, and educational destinations for students.

Generally, the local riparian areas or zones occur in canyon bottoms and appear as thin green ribbons. Many of the high mountain drainages have a green strip less than 15 feet wide (including the creek channel); the largest streams in the area vary in width from 10 to 40 feet. The Pit River, however, is in excess of 50 feet wide in the Pit River Canyon. The width of riparian vegetation varies with the width of water present in creeks and streams, and is limited by the soil and water influence zone along the stream or creek. Riparian communities represent a relatively minor proportion of the total acres in the AFO area (<0.4%), but are considered extremely important as wildlife habitat and are popular for recreational purposes.

CALVEG wetland and riparian communities include wet meadows (grass/sedge/rush); tule-cattail-sedge; willow; quaking aspen; and willow-quaking aspen. The tule-cattail-sedge communities are locally rare and occur along slow-moving streams, in inundated meadows, and in silted-in livestock reservoirs.

The meadow or seep community comprises meadow, spring, or seep areas that are wet most of the year. It supports a rather dense community of primarily riparian grass-like plants, possibly with a few scattered medium shrubs (3–6 feet). Rushes and sedges dominate this community.

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Other associated species include willows, golden currant, Wood's rose, Nebraska sedge, thickhead sedge, Baltic rush, swordleaf rush, common spikerush, short-awn foxtail, meadow barley, spike redtop, creeping bentgrass, western blueflag, hoary nettle, long-stalked clover, and seep monkeyflower.

Dry meadows or meadows that have been degraded support Kentucky bluegrass, California oatgrass, mat muhly, slender hairgrass, foxtail barley, Baltic rush, Douglas sedge, tanseyleaf evening primrose, common yarrow, western blueflag, and common dandelion.

### 3.20 Noxious Weeds and Invasive Species

Noxious weeds are now recognized worldwide as posing threats to biological diversity second only to direct habitat loss and fragmentation. Noxious weeds are known to alter ecosystem functions such as nutrient cycles, hydrology, and wildfire frequency; to outcompete and exclude native plants and animals; and to hybridize with native species.

All natural communities are susceptible to invasion by noxious weeds. The presence and abundance of noxious weeds in an ecosystem are highly dynamic, subject to changes in the local environment. The noxious weeds currently considered problematic in the AFO area—as well as their locations, infestation size, and ranking for control—can change in a short period (within 2 years) as new noxious weeds are identified, infestation sizes increase or decrease, and priorities change.



**Scotch thistle**

Factors used to describe the current condition of noxious weeds in the planning area include presence/absence, number of net acres (i.e., acres currently infested), and number of gross acres (i.e., acres susceptible to the spread of a noxious weed within a geographical area). For example, five occurrences of yellow star-thistle, totaling 10 acres, might be in an area roughly defined to be 100 acres. In this instance, the net acreage would be 10 acres and the gross acreage would be 100 acres. Most current noxious weed infestations are treated with an integrated weed management approach. Most sites are treated with a combination of manual, chemical, biological, and cultural methods. Because there is presently no contract to conduct noxious weed control in the majority of Lassen County, many weed occurrences are left untreated.

Currently, more than half the acreage administered by the AFO has not been inventoried for noxious weeds. The known noxious weeds, watershed, and approximate net and gross acres on the lands administered by the AFO are summarized in Table 3.20-1. Map VEG-2 shows the known distribution of noxious weeds in the AFO area.

The trends of noxious weeds in the field office area are measured in terms of the number, status, net acreage, and gross acreage occupying a certain area. Specific data on these measurements are lacking for the lands administered by the AFO. A positive trend for noxious weeds would constitute a reduction in any one of these factors, with the ultimate goal of controlling or eliminating the noxious weeds from the lands administered by the AFO. Table 3.20-1 summarizes the current trends observed in each of the AFO watersheds.

Possible changes in the condition of noxious weeds are difficult to predict because of the complex interaction of natural processes and management influences. There is a consensus that in the absence of continued inventory, coordination of weed treatments, and a yearly evaluation of each weed program, there will be a continued spread of noxious weeds. Certain noxious weeds have already reached a high level of infestation and are considered to be “too common to control.” Without an emphasis on continued inventory and control, there is a high potential for other noxious weeds to increase dramatically on all watersheds and to ultimately become “too common to control” as well. A memorandum of understanding (MOU) has afforded to each land manager bordering BLM-managed lands the opportunity to coordinate all weed treatments. It is anticipated that the situation of noxious weeds on lands administered by the AFO will continue to improve or remain static with the aid of cooperating groups and agencies.

**Table 3.20-1** Summary of Known Noxious Weeds in the Alturas Field Office Area

Noxious Weed Species	Watershed	Number of Net Acres	Number of Gross Acres
Barbed goatgrass ( <i>Aegilops triuncialis</i> )	Fall River/Big Valley	<40	<500
Bull thistle ( <i>Cirsium vulgare</i> )	Warm Springs	<20	500
	North Fork/South Fork	<10	1,000
	Madeline Plains	15	200
Canada thistle ( <i>Cirsium arvense</i> )	Fall River/Big Valley	<40	<500
	Warm Springs	<20	500
	North Fork/South Fork	10	200
	Tulelake/Devil's Garden	5	200
Dalmatian toadflax ( <i>Linaria dalmatica</i> )	Goose Lake	15	10,000
	Tulelake/Devil's Garden	5	2,000
Diffuse knapweed ( <i>Centaurea diffusa</i> )	North Fork/South Fork	<1	1,000
Dyer's woad ( <i>Isatis tinctoria</i> )	Fall River/Big Valley	<40	<500
	Warm Springs	<20	500
	North Fork/South Fork	20	50,000
	Goose Lake	15	10,000
Halogeton ( <i>Halogeton glomeratus</i> )	North Fork/South Fork	<10	1,000
Hounds tongue ( <i>Cynoglossum officinale</i> )	Fall River/Big Valley	50+	1,000
	Warm Springs	150	1,000
Jointed goatgrass ( <i>Aegilops cylindrical</i> )	Fall River/Big Valley	<40	<500
Leafy spurge ( <i>Euphorbia esula</i> )	Tulelake/Devil's Garden	N/A <sup>a</sup>	N/A <sup>a</sup>
Mediterranean sage ( <i>Salvia aethiopis</i> )	Warm Springs	20	500
	North Fork/South Fork	300	50,000
	Goose Lake	15	10,000

Noxious Weed Species	Watershed	Number of Net Acres	Number of Gross Acres
Medusa-head ( <i>Taeniatherum caput-medusae</i> )	Fall River	3,000	50,000
	Warm Springs/Big Valley	1,000	20,000
	North Fork/South Fork	10,000	100,000
	Tulelake/Devil's Garden	15	1,000
Musk thistle ( <i>Carduus nutans</i> )	Warm Springs	<20	500
Perennial pepperweed ( <i>Lepidum latifolium</i> )	Warm Springs	<20	500
	North Fork/South Fork	<5	50
	Madeline Plains	1	2-3,000
Poison hemlock ( <i>Conium maculatum</i> )	North Fork/South Fork	<10	1,000
Puncture vine ( <i>Tribulus terrestris</i> )	North Fork/South Fork	<10	1,000
Russian knapweed ( <i>Acroptilon repens</i> )	North Fork/South Fork	<1	1,000
	Madeline Plains	1	200
Russian thistle ( <i>Salsola tragus</i> )	North Fork/South Fork	<10	1,000
Scotch thistle ( <i>Onopordum acanthium</i> )	Fall River/Big Valley	100	2,000
	Warm Springs	100	50,000
	North Fork/South Fork	100	20,000
	Madeline Plains	300	5,000
	Goose Lake	15	1,000
	Tulelake/Devil's Garden	5	3,000
Spotted knapweed ( <i>Centaurea maculosa</i> )	North Fork/South Fork	<1	1,000
Squarrose knapweed ( <i>Centaurea squarrosa</i> )	Fall River/Big Valley	200	10,000
	Warm Springs	100	20,000
St. Johnswort ( <i>Hypericum perforatum</i> )	Fall River/Big Valley	<40	<500

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Noxious Weed Species	Watershed	Number of Net Acres	Number of Gross Acres
Whitetop ( <i>Cardaria draba</i> )	Warm Springs	<20	500
	North Fork/South Fork	<10	1,000
	Madeline Plains	<5	2,000
Yellow star-thistle ( <i>Centaurea solstitialis</i> )	Fall River/Big Valley	200	50,000
	Warm Springs	10	1,000
	Goose Lake	15	1,000

<sup>a</sup> The Siskiyou Department of Agriculture has eradicated occurrences of this species.

### 3.21 Special Status Plants

In this document, special status plants are defined as plants requiring special management consideration. Special status plants include:

- Species listed or proposed for listing as threatened or endangered under the Endangered Species Act (50 CFR 17.12 for listed plants; and various notices in the Federal Register for proposed species);
- Species that are candidates for possible future listing as threatened or endangered under ESA (Federal Register 67:40657);
- Species that are federal species of concern (i.e., former U.S. Fish and Wildlife Service [USFWS] C1 or C2 candidates);
- BLM-designated sensitive and special interest species.
- California state-listed species, and CNPS List 1B species (plants that are rare, threatened, or endangered in California and elsewhere).



**Bakers Globe Mallow**

Based on the most current data, 12 special status plants are known to occur in the AFO area; an additional 10 species are also suspected to occur in the planning area. Since the writing of the Draft RMP, two special status species have been downlisted and are now designated as special interest or watch species. They are Baker's globemallow (*Iliamna bakri*) and Modoc milk-vetch (*Astragalus pulsiferae* var. *coronensis*).

Table 3.21-1 (at the end of this section) provides a list of these species with information on their regional distribution, local occurrence, legal status, habitat requirements, and threats to their populations. This table shows species that are both known and suspected to occur on public lands administered by the AFO. Suspected special status plants are those species (meeting the BLM sensitive plant criteria) that occur on adjacent lands and in habitats that occur in the field office area. Map VEG-3 shows the known distribution of special status plants in the AFO area.

Under BLM policy, special status plants must be given management consideration to avoid contributing to the federal listing of these species. Location of any special status plants during project clearances may require changes in the project to avoid disturbing the plant occurrence, or may require approval of the BLM State Director to proceed with the proposed action. Under California BLM Policy, all CNPS List 1B species automatically qualify for special status. Other species may be added to the sensitive species list upon approval by the State Director.

Invasion and encroachment by noxious weeds, wildfires, and drought are natural factors that could have an impact on special status plants. Wildfire is, or was formerly, a natural occurrence in many habitats occurring on BLM lands. In general, fire could affect any special status plant species associated with tree and shrub habitats and, to a lesser extent, herbaceous habitats. Fire is specifically identified as having an impact on only one special interest species occurring in the AFO area: *Iliamna bakri*. This plant responds positively to fire by increasing in prevalence after fire; it occurs in sagebrush, juniper, and mountain mahogany-dominated communities.

Changes in the hydrologic regime caused by drought could affect special status plants that require moist or aquatic habitats or microhabitat sites. These plants are *Gratiola heterosepala*, *Mimulus evanescens*, *Orcuttia tenuis*, *Pogogyne floribunda*, *Polygonum polygaloides* ssp. *esotericum*, and *Potentilla basaltica*.

Habitat conversion (from sagebrush communities to nonnative annual grassland communities or to juniper woodlands) has a potential adverse effect on special status plants. Reasons for the changes in community structure can be found in the juniper woodlands section above. Habitat conversions may result from a variety of management activities, including but not limited to grazing activities, wildfire and fire suppression activities, and alteration of hydrologic regimes.

Several human activities have the potential to affect occurrences of special status plants. Disturbance from OHV use is identified as a specific threat, or potential threat, to the following species: *Astragalus anxius*, *Eriogonum prociduum*, *Ivesia paniculata*, *Lupinus uncialis*, *Gratiola heterosepala*, and *Potentilla basaltica*. Mining is not identified as a threat or potential threat to any special status plants in the AFO area. There has been mining exploration on the Big Tablelands in Siskiyou County; mining could affect special interest plants but not special status species.

Timber harvesting is a potential threat to special status plants in the AFO area. There have been negative impacts from logging truck traffic on *Eriogonum prociduum* plants that were growing in the old road bed. Livestock use can negatively affect occurrences of special status plants in several ways; these include grazing, which removes plant material and may prevent flowering and fruiting; and trampling, which can damage or destroy plants. Trampling can also negatively affect the habitats for special status plants, for example, by compaction of the soil or damaging stream banks. Grazing may be beneficial in removing or reducing the vigor of competing plants and preventing the establishment of shrub cover in open herbaceous habitats.

**Table 3.21-1** Special Status Plants Known or Suspected to Occur in the Alturas Field Office Area

Plant Name	Status <sup>1</sup>	Occurrence in AFO	Locations <sup>2</sup>	Quads <sup>3</sup>	Habitat	Threats	Needs	Current-Relevant Information
<i>Astragalus anxius</i> Field milk-vetch Fabaceae	CNPS 1B	Known (1 site)	Ash Valley and vicinity. Also on Modoc National Forest.	675C, 676D Las	Barren rocky flats in sagebrush scrub, juniper, & conifer woodland.	Noxious weeds (medusahead), OHV, and livestock trampling are potential threats.	Continue to inventory. Monitor Ash Valley regularly for threats. Eradicate medusahead from Ash Valley ACEC.	Known only from Ash Valley area.
<i>Eriogonum prociduum</i> Prostrate buckwheat Polygonaceae	CNPS 1B	Known (10 sites)	Ash Valley ACEC & S of Alturas & in Warner Mtns.	658C, 675C, 676D, 691A, 692A, 692C, 708C Las, Mod. Also in WA & OR	Dry barren rocky slopes and flats usually in sagebrush scrub on soils of volcanic tuff.	Trampling by livestock and OHV traffic. Medusahead invasion in Ash Valley ACEC.	Continue to inventory for. Ocular monitor occurrences regularly for potential impacts.	Unique habitat: Occurs on BLM and Modoc National Forest.
<i>Gratiola heterosepala</i> Boggs Lake hedge-hyssop Scrophulariaceae	CE CNPS 1B	Known (5 sites, possibly more)	Green Place, Fall River Valley.	661A, 678B, 678D; on Lassen National Forest & Modoc National Forest Las, Mod, Sha Also in OR.	Vernal pools and flats. Often occurs in livestock pit reservoirs.	Changes in water regime. No current threats; one site is fenced. Potential threat with heavy spring grazing	Continue to inventory for.	CA State Endangered, common on Modoc Plateau
<i>Ivesia paniculata</i> Ash Creek ivesia Rosaceae	CNPS 1B	Known (6 sites)	Ash Valley area and Hwy. 139 near Willow Creek.	659A, 675A, 675C, 676D Las	Rocky barren open areas in sagebrush scrub, juniper and coniferous forest woodland.	Trampling by livestock and OHV use may impact. Medusahead in Ash Valley ACEC.	Continue to inventory for. Ocular monitor BLM occ. regularly for potential threats. Eradicate medusahead in Ash Valley ACEC.	Ash Valley ACEC is prime habitat
<i>Lupinus uncialis</i> Lilliput lupine Fabaceae	CNPS 2	Known (5 sites, not in NDDb)	SW of Alturas.	674B, 692A, 692B, 692D Mod. Also in NV & OR.	Dry volcanic gravelly flats in sagebrush/juniper scrub.	Livestock and OHV disturbance of habitat.	Continue to inventory for.	Disjunct from Great Basin populations. Micro-habitat: small rills in naturally erosive volcanic soils.

**Table 3.21-1** Special Status Plants Known or Suspected to Occur in the Alturas Field Office Area

Plant Name	Status <sup>1</sup>	Occurrence in AFO	Locations <sup>2</sup>	Quads <sup>3</sup>	Habitat	Threats	Needs	Current-Relevant Information
<i>Mimulus evanescens</i> Ephemeral monkeyflower Scrophulariaceae	CNPS 1B	Known (2 sites)	Moll Reservoir and Lassen National Forest. Historic "10 mi south of Ravendale".	657B, 676A, 676D Las, Mod, Sis; Also in OR, ID, NV?	At the edge of reservoirs & lakes and vernal moist depressions in sagebrush scrub.	Changes in water regime and trampling.	Establish monitoring.	Only one AFO occurrence.
<i>Orcuttia tenuis</i> Slender orcutt grass Poaceae	FT CE CNPS 1B	Known (1 site)	Green Place; several on Lassen National Forest and new locations on Modoc National Forest.	678A, 678B Sha, Sis, Las +	Vernal pools.	Change in water regime. Pool is excluded from livestock.	Continue to inventory for. Occasionally monitor BLM occurrences regularly for potential threats.	Species Management Guide developed.
<i>Oryzopsis exigua</i> Little ricegrass Poaceae	CNPS 2	Known (1 site)	Upper slope of Mt Dome.	730C Las, Sis. Also in NV, OR	Rocky outcrops in sagebrush steppe	On steep rocky slopes not subject to cattle grazing.	Continue to inventory for. 2 recent sites in CA: this one and Mt. Dome in Siskiyou Co. Should be in between.	To be looked for on talus slopes of basalt outcrops & on lava fields of steep slopes.
<i>Pogogyne floribunda</i> Profuse-flowered pogogyne Lamiaceae	CNPS 1B	Known (several sites)	Lava WSA, Strip Allotment north of Alturas, & Green Place.	660C, 662B 708B, 708C, Las, Mod, Sha	Vernal pools and vernal wet flats in sagebrush scrub.	Trampling by livestock in spring may impact.	Continue to inventory for. Occasionally monitor BLM occurrences biannually.	Eight occurrences in AFO
<i>Polygonum polygaloides</i> ssp. <i>esotericum</i> Modoc County knotweed Polygonaceae	CNPS 1B	Known (2 sites)	Strip Allotment and adjacent Devil's Garden area.	708B, 708C Mod, Sie	Mesic sites in sagebrush scrub, drying reservoirs and edges, and vernal pools.	Trampling by livestock. Changes in water regime.	Continue to inventory for. This plant is often difficult to identify and intergrades with other spp.	Only two occurrences in AFO. More common in Modoc National Forest.

**Table 3.21-1** Special Status Plants Known or Suspected to Occur in the Alturas Field Office Area

Plant Name	Status <sup>1</sup>	Occurrence in AFO	Locations <sup>2</sup>	Quads <sup>3</sup>	Habitat	Threats	Needs	Current-Relevant Information
<i>Potentilla basaltica</i> Black Rock potentilla Rosaceae	CNPS 1B Fed Candi- date	Known (1 site)	Occurs in Ash Valley ACEC. Other occurrence at Soldiers Meadows, NV	675C Las NV	Moist usually alkaline meadows in sagebrush scrub.	Heavy livestock grazing or trampling in spring and OHV use.	Continue to inventory for.	Candidate sp., Fed. Reg. 67(114). 6/13/2002. Found in Ash Valley ACEC and adjacent private lands.
<i>Stenotus lanuginosus</i> Woolly stenotus Asteraceae	CNPS 2	Known (at least 4 sites)	Sagehen summit, Hayden Hill, south of Ash Valley. Also Lassen and Modoc National Forests.	659A, 674C, 675A Las	Moist sagebrush scrub.	Possibly livestock grazing.	Continue to inventory for.	Disjunct occurrences
<i>Astragalus agrestis</i> Field milk-vetch Fabaceae	CNPS 2	Suspected	Madeline Plains N of Termo.	570A, 657B, 658A, 658D Las; NV, OR+	Sagebrush Scrub flats.	None known but watch grazing practices.	Continued inventory on the Madeline Plains.	Madeline Plains north of Termo. Highly disjunct from other states' occurrences.
<i>Astragalus lemmonii</i> Lemmon's milk-vetch Fabaceae	CNPS 1B	Suspected	Ash Valley.	675C, 676D, Las, Mod, Plu, Sie, Mon; NV OR	Moist sandy flats in silver sage.	Land conversion.	Inventory for on BLM parcels in Madeline Plains.	Need more information.
<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i> Long-haired star-tulip Liliaceae	CNPS 1B	Suspected	N of Canby, E Sha. Co. and N Fall River Valley None known on BLM.	662B, 662C, 676D, 677B, 680A, 693B, 693C, 694A, 694B, 694C, 694D, 695A, 695C, 695D, 696C, 696D, 710C, 710D, 711D Las, Mod, Sha, Sis. Also OR	Meadows and vernal moist usu. clay flats.	Plants and flowers are grazed by livestock. Changes in moisture regime.	Continue to inventory for. This plants was proposed to be down listed but remains a CNPS 1B.	Found on Modoc Plateau. Some potential habitat in AFO.

**Table 3.21-1** Special Status Plants Known or Suspected to Occur in the Alturas Field Office Area

Plant Name	Status <sup>1</sup>	Occurrence in AFO	Locations <sup>2</sup>	Quads <sup>3</sup>	Habitat	Threats	Needs	Current-Relevant Information
<i>Eriogonum umbellatum</i> var. <i>glaberrimum</i> Green buckwheat Polygonaceae	CNPS 1B	Suspected	Along the slopes of the Warner Mtns. from Davis Creek to Ft. Bidwell. None known on BLM.	708A,724B 726B Mod, Sis. Also OR	Sandy or gravelly sites in sagebrush scrub and montane coniferous forests.	None known. Could possibly be grazed by livestock.	Continue to inventory for within habitat range.	Potential habitat in Alturas and Surprise FOs on lower slopes of the Warner Mtns.
<i>Galium glabrescens</i> ssp. <i>modocense</i> Modoc bedstraw Rubiaceae	CNPS 1B	Suspected	E slope of Warner, Twelvemile Creek area.	673B, 690B, 690C,707C, 724A Mod	Gravelly slopes and near rock outcrops in sagebrush/juniper.	None apparent but may be grazed by sheep and possibly some livestock grazing.	Continue to inventory for in CA.	Occurs on Warner Mtns.
<i>Galium serpenticum</i> ssp. <i>warnerense</i> Warner Mtns bedstraw Rubiaceae	CNPS 1B	Suspected	Warner Mtns, mostly w. slope. None known on BLM.	724B,725A Mod OR	Steep talus slopes around bases of rocks.	Probably not grazed by livestock.	Continue to inventory for especially on steep slopes on west side of Warner Mtns.	Potential habitat on western slopes of Warner Mtns.
<i>Lomatium roseanum</i> Adobe parsley Apiaceae	No CA status	Suspected	Tablelands south of Alturas. Occurs on the Sheldon NWR & also SE OR. Possibly CA.	? 691C; Hum Co NV?, Was; OR	Probably dry open rocky clay flats and slopes in sagebrush scrub.	Probably grazed to some extent by sheep and cattle.	Be aware of plant and continue to inventory for. Taxonomy being studied at University of Illinois.	AFO could have several occurrences.
<i>Phacelia inundata</i> Playa phacelia Hydrophyllaceae	CNPS 1B	Suspected	SE side of Eagle Lake, nw Modoc Co, NW Nevada.	640B,640C 712A,728C Las, Mod. Also NV & OR	Moist alkaline playas and meadows.	Trampling by livestock.	Continue to inventory for.	Northwest Modoc Co.
<i>Rorippa columbiae</i> Columbia yellow cress Brassicaceae	CNPS 1B	Suspected	None known on BLM.	642D	Vernally wet flats in sagebrush steppe.	Livestock trampling, hydrologic changes.	Be aware of this plant and search for in suitable habitat.	None known on BLM administered lands. Small potential for this plant in AFO.

Table 3.21-1 Special Status Plants Known or Suspected to Occur in the Alturas Field Office Area

Plant Name	Status <sup>1</sup>	Occurrence in AFO	Locations <sup>2</sup>	Quads <sup>3</sup>	Habitat	Threats	Needs	Current-Relevant Information
<i>Thelypodium howellii</i> var. <i>howellii</i> Howell's thelypodium Brassicaceae	CNPS 1B	Suspected	Known from east edge of Madeline Plains, and Ash Valley (private).	656A,656C	Moist alkaline meadows and flats in sagebrush steppe.	Could be potentially impacted by livestock grazing and habitat manipulation.	Continue to inventory for. Occasionally monitor occurrences biennially for potential impacts. Relocate Madeline Plains, Dixie Valley occurrences.	Known from east edge of Madeline Plains. Potential habitat elsewhere.

CNPS Inventory 2001. FT=Federally threatened, CE= California endangered. All plants are BLM sensitive (special status species).

<sup>2</sup> Locations refer only to the locations within the AFO. For suspected occurrences, other lands and all known quadrangle maps are given.

<sup>3</sup> Quads means U.S. Geological Survey topographic maps or quadrangles and are only those in or near BLM lands. The quad numbers are from the CNPS Inventory, Sixth Edition.

### 3.22 Visual Resources

Visual resources are scenic features of the landscape that include land, water, vegetation, structures, and other objects. BLM uses a visual resources management (VRM) classification system during planning activities to manage the quality of the landscape and assess the level of potential impacts on visual resources resulting from development activities. These classes, Class I through Class IV, are developed through an inventory process and are based on the visual quality of an area, the sensitivity of the landscape to change, and the distance from which the landscape is viewed. The results of the VRM inventory process performed for the PRMP are shown in Table 3.22-1.

**Table 3.22-1** Visual Resources Management Inventory in the Alturas Field Office Area

VRM Class	Acres
I	56,648
II	157,177
III	104,006
IV	185,214

The visual landscapes in the AFO area are varied and diverse, ranging from dense forests of white fir and pines, to open grasslands/sagebrush steppes, to deep volcanic canyons. Lava fields with oaks and redbud vegetation provide fall color in some areas and contain cinder cone landforms.

AFO lands include four WSAs composed primarily of volcanic features of cinder cones and plateaus. These areas include interesting geologic visual resources as well as riparian areas that support a variety of wildlife populations. In addition, the WSAs support dense juniper forests, mountain mahogany-covered slopes, and pine- and white-fir topped highlands.

A vista overlook west of Fall River Mills provides excellent views of the Winters Toll Road, the military road to Fort Crook, old Highway 299 (proclaimed as the Yellowstone Cutoff in 1929), and Pit River Falls. However, large expanses of juniper have been removed from the landscape in recent years without considerations for visual or other resource values. Many of these removal projects are visible from U.S. Highway 395, State Route 299, and local country roads—and often substantially alter the visual character of the landscape.

### **3.23 Water Resources**

The following discussion gives a general overview of the AFO area water resources and regulations pertinent to the resource.



#### **3.23.1 Climate and Precipitation**

The AFO area is generally a high desert climate, with mild summers and cold winters. Precipitation is mainly in winter months and falls as either rain or snow. The 10-year, 24-hour precipitation quantity ranges between 1.8 inches in the eastern portions of the study area to 4.0 inches in the western portions. The 100-year, 24-hour precipitation quantity ranges between 2.5 and 4.5 inches (Western Regional Climate Center 1973). Annual precipitation ranges between 7 and 22 inches.

#### **3.23.2 Surface Water**

##### **Hydrology**

For this discussion, the AFO area has been divided into six watersheds: North Fork/South Fork, Warm Springs/Big Valley, Fall River, Madeline Plains, Goose Lake, and Tulnelake/Devil's Garden. No data were available for the Tulnelake/Devil's Garden watershed.

BLM has very little information on water quantity on public lands in the AFO area. Reservoir capacities are known, but little monitoring of their levels has been conducted. Few surface waterbodies within the AFO area have permanent gauging stations, and no historical flow records were available for this report. However, flows in AFO area streams were measured by BLM staff during low flow (i.e., summer and fall) in 2002 and 2003. These measurements are the source of information in the discussion that follows. Flows are most likely significantly higher in streams unaltered by reservoirs during spring due to snow melt and higher precipitation. Consequently, the flows reported herein may be considered conservative. Flows taper off rapidly as summer and fall approach, and when precipitation is slight and snow is gone. Flows coming out of reservoirs may not fit this pattern and do not reflect the natural hydrology of the watershed.

In total, AFO area streams have been measured to average approximately 120 acre-feet of discharge per day. Educated estimates for high yields (early spring) will be approximately 10-fold of this number, or 1,200 acre-feet per day.

##### **Water Diversions and Hydrologic Modification**

BLM has traditionally developed various forms of direct diversion in association with its livestock grazing program. Developments for the benefit of wildlife range from the development of guzzlers to wetlands and reservoirs. Subtle changes in surface water conditions have occurred over many decades as a result of roads and past heavy livestock use. Relatively large irrigation dams have been built under permit on public lands as well.

Reservoirs collecting water within intermittent or ephemeral drainages are the main source of hydrologic modification. Other modifications include stock ponds, spring developments, and a small number of diversions. The modified hydrology is considered necessary to maintain livestock distribution and to provide for wildlife, recreation, fire management, mining, and irrigation use.

The AFO area holds 618 water rights actions in the form of 110 applications, 211 stock pond certificates, 135 statements of water diversion and use, 95 permits, and 67 licenses. Most of the diversions out of streams in this area are minimal—except for North Fork Fitzhugh Creek. During low flow, half of the flow is allowed to be diverted out of this creek.

### **3.23.3 North Fork/South Fork Watershed**

The North Fork/South Fork watershed is located on the western slopes of the South Warner Mountain Range and is part of the Sacramento River Basin. This watershed includes many of the AFO area's perennial streams, such as Fitzhugh Creek, Dry Creek, Cedar Creek, Pine Creek, and Stones Canyon. Important intermittent streams include Crooks Canyon and Jim Creek.

#### ***Surface Water Hydrology***

In 2002 and 2003, Fitzhugh Creek flows ranged from 60 cubic feet per second (cfs) during late spring to 2 cfs during fall. Pine Creek flows ranged from 80 to 5 cfs during a similar timeframe. These streams are fed in spring and early summer by snowmelt and are maintained through the rest of the year by groundwater contributions. Dry Creek is fed by one primary spring and maintains a fairly constant flow throughout much of the year—around 1 cfs during late spring and around 0.1 cfs during fall. Stones Canyon is fed by groundwater contributions and by Cottonwood Spring, and maintains a flow around 0.2 cfs during late summer. Cedar Creek flow was measured at 8.3 cfs during early summer and was estimated at 3 cfs during late summer. The Cedar Creek headwaters consist of a series of springs maintaining a constant flow of about 1.5 cfs. This contributes a substantial amount to the overall flow of Cedar Creek especially during summer months. Intermittent tributaries, snowmelt, storm water runoff, springs and groundwater recharge contribute to the remaining flow. Cedar Creek is monitored every year as per the Cedar Creek/Tule Mountain Plan of 1989.

#### ***Geomorphology***

The streams in the North Fork/South Fork watershed are contained primarily within stony outcrop canyons, and banks are stable due to high boulder substrate composition. Fitzhugh Creek contains both canyon/boulder reaches and meadow reaches. The stream is somewhat incised in the meadow reaches, with a substrate mix of boulder, cobble, sand, and silt. Lower Cedar Creek is primarily located in a meadow area with silty loam soils and is for the most part severely entrenched due to grazing practices. The headwaters are exclosed and restored to a properly functioning condition with stable banks and little entrenchment. A portion of the middle reach is located within a narrow canyon and is fairly stable due to high boulder composition. However, the majority of the creek is severely entrenched due to unstable soils and livestock use.

### **3.23.4 Warm Springs/Big Valley Watershed**

The Warm Springs/Big Valley watershed is located between the confluence of the North and South Fork of the Pit River and the Big Valley Mountain Range, and is part of the Sacramento River Basin. Perennial streams, such as Rattlesnake Creek, Ash Creek, Holbrook Canyon, Willow Creek, and Juniper Creek, are contained within this watershed. Important intermittent streams include Dutch Flat Creek, Spring Gulch, Noble Creek, Upper Holbrook Canyon, and Rye Grass Swale.

### ***Surface Water Hydrology***

Rattlesnake Creek flows out of Big Sage Reservoir at around 50 cfs during summer. During the middle of October, flow is reduced to approximately 1.5 cfs. The branch of Ash Creek that runs through BLM land flows at approximately 1 cfs; the main stem of Ash Creek maintains significantly higher flow at around 15–20 cfs during fall. Holbrook Canyon Creek flows out of Holbrook Reservoir at about 0.2 cfs during midsummer months. Juniper Creek flows in and out of Iverson Reservoir at 1 cfs during summer. Willow Creek flows at about 6.5 cfs during midsummer months. Dutch Flat Creek, Spring Gulch, Noble Creek, Upper Holbrook Canyon, and Rye Grass Swale are typically dry during summer and fall.

### ***Geomorphology***

The streams in the Warm Springs/Big Valley watershed are contained primarily within stony outcrop canyons in the upper reaches, and banks are stable due to high boulder substrate composition. Rattlesnake Creek and Ash Creek flow into meadow systems in the lower reach and become somewhat entrenched within less stable loamy soil. Juniper Creek in the upper reaches is heavily vegetated by wood species and dominated by boulder substrate. Juniper Creek flows in the lower reaches through a stable rocky flat meadow. The intermittent streams are all stable due to high boulder and cobble composition. Lower Holbrook Canyon Creek is contained within a stony canyon and is very stable due to high boulder and cobble content. Upper Holbrook Canyon has more of a meadow composition and is severely entrenched where the county road inhibits the natural hydrology of the creek. Willow Creek flows through a low-gradient canyon, and the substrate is composed of gravel and sand. Banks are stabilized by thick colonization of woody and riparian species.

### **3.23.5 Fall River Watershed**

The Fall River watershed is located west and south of the Warm Springs/Big Valley watershed, and is part of the Sacramento River Basin. This watershed is situated between the Shasta and Lassen volcanoes; consequently, much of the area is volcanically influenced. It contains some of the AFO area's perennial streams, such as Horse Creek, Beaver Creek, and Russell Dairy Creek. One intermittent stream contained in the watershed is Spring Gulch.

### ***Surface Water Hydrology***

Flows in Horse Creek were measured at 8 cfs during mid-summer. Beaver Creek flows were estimated at 3 cfs during midsummer. These streams are fed in spring and summer by snowmelt, and are maintained through the rest of the year by groundwater contributions. Beaver Creek is fed by a major spring about mid-length along its path. The upper reach becomes dry in summer. Russell Dairy Creek is fed by one primary spring and maintains a fairly constant flow throughout summer—around 1 cfs. Spring Gulch is dry in summer but probably transmits significant flow during winter and spring due to snowmelt and storm water runoff.

### ***Geomorphology***

Beaver and Horse Creeks are contained primarily within stony outcrop canyons. These canyons have widened enough to allow meadow areas to form adjacent to the creek beds in some areas. Horse Creek substrate is mostly cobble and gravel. Beaver Creek in the lower reach is mostly boulder and cobble, with primarily sand in the upper reach. Areas in narrower parts of the canyons are stable due to high boulder composition, but areas in the silty/sandy meadow areas are somewhat entrenched. Russell Dairy Creek exhibits canyon reaches and meadow reaches. The upper reach is meadow due to a high riparian vegetative component and is very stable until the gradient starts to increase. The lower reach is similar but is contained within a stony outcrop canyon. Substrate consists primarily of boulder in the upper reach and mostly cobble in the lower reach.

#### **3.23.6 Madeline Plains Watershed**

The Madeline Plains watershed is located on the western slopes of the extreme South Warner Mountain Range, below the North Fork/South Fork watershed, and includes the northern part of the Madeline Plains. This watershed is located within the Lahontan Basin. Dry Creek (a different feature than the Dry Creek in North Fork/South Fork watershed), an intermittent stream, is located in this watershed.

### ***Surface Water Hydrology***

Dry Creek had no flow during summer months but maintains pools fed by spring sources throughout summer. These streams are fed in spring and summer by snowmelt, and are maintained through the rest of the year by groundwater contributions or incidental flowing tributaries. Dry Creek is fed by a series of springs, although they are not enough to maintain flow in the creek during summer.

### ***Geomorphology***

Dry Creek is a stable system with lots of riparian vegetation and high boulder composition. The creek does not seem to be entrenched but is located within a shallow stony canyon.

#### **3.23.7 Goose Lake Watershed**

The Goose Lake watershed is located on the western slopes of the Warner Mountain Range and includes Goose Lake and the Rocky Rim to the west of Goose Lake. It is located within the Sacramento River Basin. Lassen Creek is the only creek in which data have been collected.

### ***Surface Water Hydrology***

Flow in Lassen Creek was estimated at 2 cfs during mid-summer. It is expected that flow increases approximately 10- to 20-fold during spring and early summer months, and is reduced during the drier and hotter parts of the year as snowmelt decreases.

### ***Geomorphology***

Lassen Creek is located in a stony canyon, and is heavily armored with boulder and woody shrub species.

**Table 3.23-1** Water Quality Conditions for Key Streams in the Alturas Field Office Area

Stream	Meets State Standard?	Meets Beneficial Use Needs?	Meets Standards and Guidelines <sup>a</sup> Water Quality Criteria?
<b>North Fork/South Fork Watershed</b>			
Fitzhugh	Mostly	Yes	Yes
Pine	Yes	Yes	Yes
Dry	Partially	Partially	Partially
Cedar	Partially	No	Probably
Stones	Partially	Probably	Probably
Crooks	No	Partially	No
Jim	Yes	Yes	Yes
<b>Warm Spring/Big Valley Watershed</b>			
Rattlesnake	No	Partially	Partially
Willow	Probably	Probably	Yes
Ash	Probably	Probably	Probably
Noble	No	No	No
Rye Grass	Insufficient data	Insufficient data	Insufficient data
Dutch Flat	Insufficient data	Insufficient data	Insufficient data
Juniper	Partially	Partially	Partially
<b>Fall River Watershed</b>			
Russell Dairy	Mostly	Probably	Yes
Beaver	Yes	Yes	Yes
Horse	No	Probably not	Probably not
Spring Gulch	Yes	Yes	Yes
<b>Madeline Plains Watershed</b>			
Dry	Probably	Probably	Probably

<sup>a</sup> Based on BLM 1999.

### 3.23.8 Water Quality

Water quality in the AFO area is discussed in terms of water quality indicators and waterbodies listed as impaired. Primary indicators used for management of impacts on water resources are temperature, nutrients, fecal coliform, turbidity, sediment, dissolved oxygen (DO), and stream channel condition. Indicators were chosen based on the S&Gs. A summary of water quality conditions for key streams is given by watershed in Table 3.23-1. No data were available for the Goose Lake and Tullake/Devil's Garden watersheds. For a more comprehensive discussion of water quality in the AFO area, please refer to the Analysis of the Management Situation (Jones & Stokes 2004) and associated specialist's reports.

#### Surface Water Quality

In general, water quality is good. The following percentages of samples meeting the standards identified above reflect data collected in 2002.

- Temperature = 100%. All temperature data collected were 21.1degrees Celsius (°C) or below.
- pH = 80%. None of the data were below 6.5 but some were above 8.5. While this represents the best available data, it bears noting that the pH meter was not calibrated on a regular basis.
- DO (milligrams per liter [mg/L]) = 87% of samples were above 7.0 mg/L.
- DO (% saturation) = 69% of the samples were above 75% saturation.

- Nutrients: Many of the creeks are nitrogen-limited, as evidenced by low nitrate concentrations and high phosphate concentrations. Although no study has been conducted to determine whether biostimulatory substances are a problem, such is suspected for many of the streams.
- Turbidity = 89% of samples were below 50 nephelometric turbidity units. Sites with higher turbidity are supplied by reservoirs that are extremely turbid. Turbidity is generally low and not considered problematic.
- Fecal coliform = 34% of the sites were below 200 colonies per 100 mL, and 72% of the sites were below 40 colonies per 100 mL. Note that samples were taken only once per site (less than the standard requires).
- Additional details for each of these water quality categories are given below.

#### ***Water Temperature***

Historic use of the land and resources including livestock grazing, roads, timber harvest, recreation, and water diversions have resulted in:

- a reduction in shade-producing canopy;
- the degradation of stream banks, making streams wider and shallower;
- a reduction of the water table in meadows through incisement, with reduced coldwater inflow into streams; and
- altered flow regimes.

With changes in management since the enactment of FLPMA and the federal Clean Water Act (PL 92-500), many of these conditions have been improving. While elevated stream temperatures are the most ubiquitous water quality problem in the AFO area, they are fairly easy to correct. Causative conditions are also improving in several streams through the implementation of management measures.

Thermal data recorders have been used throughout the resource area for a number of years to better understand the conditions and variability of stream temperatures. While providing a great deal of data, only cursory analysis of this data, primarily comparing observed temperatures to the State of California's temperature objectives, has been possible. The influence of coldwater inflow and dispersion is not accounted for in any study. A study of dispersion effects on Smoke Creek (Eagle Lake Field Office) is currently in progress. Initial results suggest that aquatic vegetation has a dramatic affect on temperature loading. In turn, heavy aquatic vegetation traps sediment, a process that leads to the narrowing and deepening of channels.

Key data needs include:

- a better understanding of the optimum balance of aquatic vegetation and open channels;
- a better understanding of how BLM's management affects nutrient loading and consequent vegetation growth to determine if the regional water quality control board's (RWQCB's) *nuisance* objectives are being met;
- additional normalization of the temperature data with factors such as net solar radiation, discharge, and segment length needs to be completed to allow the data to be comparable and to establish trends; and
- temperature modeling needs to be conducted to determine a stream's potential to meet the state's standards and the needs of desired beneficial uses.

### ***Dissolved Oxygen***

The most recent data were point-in-time observations. These data provide some reference to compare saturation percentage with temperature data and some general idea of oxygen concentrations. Due to diurnal fluctuation and organic decomposition variables, continuous sampling of DO would be needed to determine if state standards are being met or if those of the desired assemblage of aquatic species are being met. Water temperature modeling is needed to determine the desired future condition.

### ***Turbidity and Suspended Sediment***

Samples were collected by isokinetic depth-integrated techniques whenever possible. As with dissolved oxygen, these point samples are usually taken only once per season, and many stations are inaccessible during peak runoff periods; hence, some sediment-producing events were probably not documented. However, turbidity and sediment fluctuations are small and gradual throughout the year except where some acute disturbance occurs. Existing sediment data combined with bed condition data (this was documented during the stream assessment, riparian assessments, and land health assessments) are sufficient to evaluate BLM's management impacts on sediment yield in the streams monitored. Recent climatic conditions limit the ability to extrapolate this information to wetter hydrologic conditions.

### ***Nutrients***

In isolated situations, nutrient loading can occur from concentrated livestock and wild horse and burro use of a water body. Discharge from recreational vehicles along shorelines is another potential source of nutrient loading.

Samples were collected by isokinetic depth-integrated techniques whenever possible, and analysis was conducted under laboratory conditions. There are probably some unaccounted laboratory errors in the results, however, due to the skill level of some of the analysts.

### ***Pathogens***

Direct fecal inputs to surface water from concentrated livestock and/or wild horses and burros will cause water quality to be out of compliance with state standards.

Samples were collected by aseptic-grab sample techniques and analyzed for fecal coliform bacteria using membrane filter techniques. Bacteria samples were generally collected only once or twice per season. While some samples fell far short of the Basin Plan objective to utilize a geometric mean of at least five samples per month, the results are disparate enough to contrast those streams that probably do not have a problem with those that do.

## **3.23.9 Impaired Waterbodies**

The only waterbody listed Section 303(d) as impaired within the AFO area is the mainstem of the Pit River, which extends from the town of Alturas to Shasta Lake (U.S. Environmental Protection Agency 2003). The Pit River is listed as impaired for nutrients, DO, and temperature. BLM does not manage a significant amount of land adjacent to the Pit River; however, it manages a significant amount of land adjacent to tributaries to the Pit River. These tributaries pass through private land before entering the Pit River. BLM activities would be required to not contribute to the identified impairments.

### **3.23.10 Groundwater**

In the BLM-managed areas, groundwater is found in defined aquifers, as well as in areas without such aquifers. Defined aquifers in the region mainly consist of weathered and fractured basalt, other volcanic deposits, and alluvial and lake deposits. In undefined areas, subsurface formations tend to be more highly consolidated and tend to have lower yields. Groundwater in these areas is often found in fractures, or weathered portions of rock between consolidated materials. Groundwater yields from fracture systems depend on the extent of fracturing, the connectivity between the fractures, and the transmissivity of the fractures (California Department of Water Resources 2003). Groundwater serves as a source for some surface waterbodies, as discussed below. Because a negligible amount of groundwater is used as a water source within the BLM-managed areas, it is not discussed in further detail.

### **3.23.11 Regulatory Setting**

#### **State of California**

The State Water Resources Control Board (SWRCB) and its nine RWQCBs are responsible for regulation of water quality and water rights in California. The SWRCB signed an MOU with BLM in 1993 to ensure the coordination of nonpoint source policies and activities, and to pursue the development of a Management Agency Agreement (MAA) and Water Quality Management Plan for nonpoint source pollution control on BLM lands. The MAA with BLM has not been completed.

The AFO area falls within the jurisdictions of three RWQCBs. Areas in the northwest, within Siskiyou County, lie in the Klamath River basin, and are under the jurisdiction of the North Coast RWQCB (Region 1). The majority of the AFO area, including all of the BLM-managed lands within Modoc County and a portion of those within Lassen County, lie in the Sacramento River basin, and are under the jurisdiction of the Central Valley RWQCB (Region 5). Areas in the southeast of the AFO area, also within Lassen County, lie in the North Lahontan basin, and are under the jurisdiction of the Lahontan RWQCB (Region 6). Each RWQCB has adopted a Basin Plan to implement plans, policies, and provisions for water quality management in the region. Beneficial uses of surface waters are identified and described in each Basin Plan. In addition, the Basin Plans identify water quality objectives for the protection of the beneficial uses of the basin.

#### ***Beneficial Uses and Water Quality Objectives***

Beneficial uses define the resources, services, and qualities of the aquatic system that are the ultimate goals of protecting and achieving high water quality. Beneficial uses of waters in the AFO area include municipal supply, agricultural supply, groundwater recharge, contact and non-contact water recreation, warm and cold spawning and freshwater habitat, and wildlife habitat.

The RWQCBs have set water quality objectives for all surface waters in their basins concerning bacteria, biostimulatory substances, chemical constituents, color, DO, floating material, oil and grease, pH, pesticides, radioactivity, sediment, settleable material, suspended material, tastes and odors, temperature, toxicity, and turbidity. Additional objectives are applied to bodies of water based on their designated beneficial uses and basin.

Beneficial uses of all groundwater in the project area have been designated as follows: municipal and domestic supply, agricultural supply, and industrial supply. Certain groundwaters have also been designated as supplying freshwater habitat, where groundwater makes contributions to and supports the flows in surface water. Water quality objectives applicable to all groundwaters have been set for bacteria, chemical constituents, radioactivity, tastes and odors, and—in Region 5, toxicity.

## 3.24 Wild Horses and Burros

Wild, free-roaming horses have a long history of occurrence within lands administered by the AFO since the Spanish era in California. Wild horse populations are characterized by their genetic predecessors, animal numbers, sex and sex ratios, and herd descriptors--such as average size, age classes, and foal crop (number of foals/total population). No burros occur with the AFO Area, but the resource is nonetheless referred to as Wild Horses and Burros.



### 3.24.1 Herd Management Areas

Wild horse herds are designated and managed according to the areas, in which they occur, referred to as herd management areas (HMAs). (See Map WHB-1). The Red Rock HMA is located in the extreme northwestern corner. Table 3.24-1 shows the current information for the HMA and the animals found there.

**Table 3.24-1** Wild Horse Herd Management Areas in the Alturas Field Office Area

Herd Management Area	Herd Number	Acres of BLM-Managed Land (Other Lands)	Appropriate Management Level (No. animals)	Estimated Population (October 2003)
Red Rock	CA-251	12,475 (4,420)	16-20	35

Presently, HMAs account for 12,475 acres of BLM-administered land in the AFO area. Non-BLM lands surrounding the Red Rock HMA consist primarily of large ranches. BLM cooperatively administers the Emigrant portion of the USDA Forest Service's Devil's Garden Wild Horse Territory. This herd mostly occupies Modoc National Forest lands. Non-BLM lands surrounding the Red Rock HMA consist primarily of large ranches.

The appropriate number of wild horses for an HMA, referred to as the appropriate management level (AML), is established through an analysis of forage and water conditions, in consideration of other competing animals (i.e., livestock and wildlife). Forage is allocated for wild horse use by the assessment of available forage and water and in consideration of competing uses. The AML is a standard used, following horse censuses, to determine whether excess animals must be removed ("gathered").

The present total AML for the Red Rock HMA in the field office area is 20 head of horses. Herd sizes estimated in October 2003 were 30 to 35 head, exceeding the aggregated AML by 50–75%. Individual band size ranges from 7 to 14 animals, there may be a variation of the ratio of males to females between the herds, but approximately 1:1. Assuming an average foaling rate of 20%, which is typical for herds in Northern California, the estimated 30 to 35 head in the Red Rock HMA would produce approximately 6 to 7 foals the next foaling season if the feed is adequate.

### **3.24.2 Horse Management**

Control of animal numbers is the principal ongoing management action for horses in the AFO area. In addition, baseline genetic data are being collected that will be used to refine current herd management. Animal movement and distribution are controlled by fencing and the distribution of watering sources, but decisions regarding these facilities are generally made through AMPs for livestock management.

Horses generally need to be gathered on a 3 to 4 year schedule to maintain animal populations at appropriate management levels; however, funding limitations have not allowed this schedule to be met. The need to gather animals is determined when monitoring indicates that populations exceed AML criteria. Future horse gathers would be supported by NEPA analyses subsequent to this PRMP. During gathers, animals are selected for return to the HMA or are determined to be excess and placed into the adoption program or put into long-term holding.

Animal numbers do exceed the AML which, with the drought of the last five years, has adversely impacted resources. An effort is made to implement gathers every three to five years to stay within the AMLs when budget permits.

## 3.25 Wildlife and Fisheries

The terrestrial and aquatic wildlife resources known or suspected of occurring in the AFO area are described in the following sections. The descriptions have been arranged in the sequence of wildlife resource goals contained in the Preferred Alternative of the PRMP for the AFO area.

The current baseline vegetation mapping for AFO is a modified version of CALVEG, and the juniper mapping GIS layer developed and maintained by the BLM AFO. To determine habitat types available to wildlife, information was taken from CALVEG. However, this mapping does not accurately describe the existing condition for much of the shrub and woodland community types as they presently exist on the landscape. Many of the riparian communities are not mapped by CALVEG. A more detailed description of the vegetation in the AFO area is contained in Chapter 3.19 “Vegetation”.



The general terrestrial habitat types were “fit” from the numerous vegetation community types, as shown in Table 3.25-1, primarily using information from CALVEG and the juniper mapping layer in the AFO area GIS. Aquatic habitats are discussed in a separate component of this section.

Wildlife habitat types on lands managed by the AFO have not been quantified. Most of the area (approximately 50% as depicted from CALVEG, but the actual amount is probably much higher) is sagebrush habitat, with an additional estimated 2-4% of antelope bitterbrush and snowbrush ceanothus. Western juniper has invaded much of the sagebrush range sites and can be found in approximately 70% of the field office lands. Historic (pre-invasion) juniper woodland only occupies about 8% of the field office area. Permanent and seasonally wet meadows comprise roughly 1 to 1.5% of the lands in the field office boundaries; however, more of these habitats are on private lands interspersed between public lands. The tall woodland types, white fir and ponderosa pine, comprise a very small portion of the field office lands, approximately 2% scattered throughout the field office area. Quaking aspen habitats are even fewer in number, accounting for about 0.1 %, although the actual extent is likely higher because many small aspen stands are too small to be captured in the mapping. Curlleaf mountain mahogany habitats, which are also considered woodlands, comprise about 0.5% of the area.

### 3.25.1 Habitats

#### *White Fir*

White fir habitat in the AFO area is located in small parcels along the north slopes of mountain peaks and in other scattered areas. White fir habitat is considered to be the coolest, moistest non-riparian habitat in northern California (Mayer and Laudenslayer 1988). The habitat serves as important cover for large mammals such as mule deer and blue grouse, cover for bat species like the Yuma myotis, and foraging habitat for several birds like black-headed grosbeak and mountain chickadee. Much of this habitat may be in danger of being lost to wildlife due to over-stocking, lack of recent fire, and recent droughts in northeastern California.

### ***Eastside Pine***

Although this habitat type has a low occurrence on the AFO, it is an extremely important habitat for bald eagle and, to a lesser extent, golden eagle. Bald eagles use large ponderosa pine trees for nesting and roosting.

All known bald eagle nests on the AFO are in ponderosa pine trees which number between 15 and 20. Additionally, this habitat is important in the five established bald eagle roosting areas, including the major bald eagle roost at Mount Dome. This habitat type is also important to mule deer, when found in association with brush in migration areas; as habitat for several bat species; and as foraging and nesting habitat for the juniper titmouse, red-breasted nuthatch, and mountain chickadee.

Ponderosa pine tolerates drought and fires much better than white fir. Most ponderosa pine habitat on BLM-administered land is located in many remote or non-accessible areas although, in some cases, it does occur near drought-killed stands of white fir. Some stands are in little danger of being lost, except possibly through catastrophic fire where it is found close to white fir or juniper woodlands.

### ***Western Juniper***

Western juniper habitat is widespread throughout the AFO area. It is increasing in density and is further expanding its range. Western juniper is used by a variety of wildlife including hiding cover for deer and pronghorn. The juniper titmouse is highly associated with this habitat type and seems to prefer it over adjacent riparian woodlands. Other birds associated with the juniper dominate woodlands include Townsend's solitaire, mountain chickadee, mountain bluebird, American kestrel, pinyon jay, black-throated gray warbler, and dusky flycatcher. Swainson's hawks prefer to use scattered juniper for nesting. Many raptors, including ferruginous and red-tailed hawks, and golden and bald eagles, use juniper for roosting and hunting perch sites nesting. Some of the myotis bat species found in the AFO area may also use juniper for roosting.

Throughout the field office, juniper is considered an invasive species on those sites that are not true juniper woodland sites as mapped in the soil surveys. Where present over an extended period of time, juniper may increase to the point of excluding important brush, grass, and forb components. Juniper has encroached into nearly all vegetation types, soil types, slopes, and elevations. Due to the large number of acres that juniper is invading into (not true juniper woodlands), management activities have increased to remove invasive juniper through fuels treatments. Most recently, the AFO has removed juniper from riparian areas, aspen stands, mahogany stands, and other areas—but treatments are needed across many areas within sagebrush ecosystems.

### ***Quaking Aspen***

Quaking aspen habitats exist as scattered stands and clumps along the landscape of the AFO area often, but not always, associated with dry and wet meadows and rim rock. Aspen commonly occur in riparian areas, snow pockets, and high elevation areas with good moisture. The aspen provides habitat to the most diverse number of animal species throughout the West. Mule deer forage in aspen and use it as thermal and hiding cover important to mule deer fawning. Quaking aspen generally support high densities of breeding birds, including tree swallow, house wren, orange-crowned warbler, western tanager, Bullock's oriole and warbling vireo. Snags are very important to cavity-nesting birds—such as bluebirds, sapsuckers, woodpeckers, and chickadees—and are important foraging areas for insectivorous birds. Several bat species use very old and decaying aspen for roosting and nursery colonies. Accipiters such as northern goshawk and Cooper's hawk nest in aspen. The only known goshawk nests on the AFO have been found in aspen stands.

**Table 3.25-1** Correlation between Plant Community Types and Wildlife Habitat Types

Plant Community Type	General Habitat Type Used in This Document	Source Information <sup>a</sup>
<b>Tree-Dominated Plant Communities</b>		
White fir Mixed fir	White fir	CALVEG
Ponderosa pine Mixed pine Grey pine Jeffrey pine Knobcone pine	Eastside pine  Eastside pine	CALVEG  CALVEG
Western juniper/big sagebrush/bearded bluebunch wheatgrass Western juniper/big sagebrush/Idaho fescue	Western juniper	CALVEG, Juniper Map
Western juniper/low sagebrush Quaking aspen/mountain big sagebrush Quaking aspen/grass	Quaking aspen	CALVEG Delineation project Delineation project
Black oak Oregon white oak California black oak	Oak woodlands	CALVEG
Ceanothus mixed chaparral Ceanothus mixed chaparral and gray pine Montane mixed chaparral	Ceanothus mixed chaparral	CALVEG
<b>Shrub-Dominated Plant Communities</b>		
Curlleaf mountain mahogany/mountain big sagebrush/bunchgrass Curlleaf mountain mahogany/mountain snowberry/grass Curlleaf mountain mahogany/Idaho fescue (bunchgrass) Curlleaf mountain mahogany/bearded bluebunch wheatgrass/Idaho fescue Birchleaf mountain mahogany	Curlleaf mountain mahogany/shrub and bunchgrasses	CALVEG
Basin big sagebrush/bunchgrass Mountain big sagebrush/bunchgrass (Thurber's and western needle grasses or needle and thread) Wyoming big sagebrush/bunchgrass Silver sagebrush/bunchgrass Snowbrush ceanothus Antelope bitterbrush	Tall sagebrush/ bunchgrass (includes rubber rabbitbrush); also antelope bitterbrush and snowbrush ceanothus	CALVEG
Low sagebrush/bunchgrass Black greasewood/big sagebrush	Low sagebrush/ bunchgrass Black greasewood/big sagebrush	CALVEG
<b>Grass/Forb-Dominated Plant Communities</b>		
Permanent wet meadows Seasonal wet meadows	Permanent and seasonally wet meadows	CALVEG
Riparian shrub woodland Willow	Riparian shrub/willow	CALVEG
Annual grass/forb Annual grass/medusahead	Annual grasslands	CALVEG

Note: This table shows how plant community types have been combined to form general "habitat types" used in this document. Plant community types were drawn from the CALVEG and juniper mapping layers for the AFO. The vegetation types that occur in very small acreages are not included in this table. See the vegetation types table (Table 3.19-1) for the exact communities, estimated acres, and percent of BLM-administered acres in the AFO area.

<sup>a</sup> Source information for communities and habitat types was derived from A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988), Matrices for Wildlife–Habitat Relationship in Oregon and Washington (O'Neil et al. 2001), and Wildlife Habitats in Managed Rangeland– the Great Basin of Southeastern Oregon (Maser and Thomas 1986).

This habitat type has been degraded through extensive livestock use and lack of fire. High-quality aspen habitat has multiple-age classes. Most stands in the AFO area have only one or two age classes evident, with few saplings present. Recently, this habitat type has received more attention on a national basis. Cool fires and mechanical thinning of juniper have helped to invigorate many stands, and several have been fenced off from cattle.

### ***Oak Woodland***

Several types of oak are found in the southwest portion of the field office; they are usually found in combination with pines, ceanothus, chaparral, and other brush types. Highly diverse in wildlife, these stands are important to a wide array of songbirds and the acorns are important to deer and turkey. They are used for cover by big game, mainly deer.

Many of the oak woodlands are overgrown in brush and contain a single age class. Treatment of these oak woodlands would be necessary to maintain or improve the health and reproduction in these areas. Carefully planned prescribed fire would benefit this habitat in providing a diverse understory of forbs, grasses, and young shrubs.

### ***Ceanothus Mixed Chaparral***

The vegetation communities that make up the ceanothus mixed chaparral habitat type occur primarily in the Fall River watershed. These communities integrate with sagebrush, oak, and pine communities. In higher elevations with cooler soil temperatures, this habitat type includes montane mixed chaparral, snowbrush, and manzanita, birch-leaf mahogany, and a variety of oak species. This habitat type often occurs following fire in conifer communities. Typical bird species found in this habitat type include fox sparrow, green-tailed towhee, and yellow warbler.

### ***Curlleaf Mountain Mahogany***

Curlleaf mountain mahogany habitat occurs across the landscape, generally at mid-elevations, and may exist as dense shrub habitats either in association with rocky areas along ridge tops or very near to it. Depending on the habitat association (Table 3.25-1), this habitat may be found on any aspect and in association with several shrubs and bunchgrasses. Mountain mahogany is an important forage and thermal cover for mule deer; and many other mammals and birds. It is often used as an intermediate, spring, or fall habitat by deer. Mule deer fawn in these habitats. Because mountain mahogany often occurs with other large shrubs, such as mountain big sagebrush, it is important in providing additional vertical and horizontal structure. This structure increases species diversity of birds and small mammals by supporting species such as Say's phoebe, sage thrasher, lesser goldfinch, western harvest mouse, and least chipmunk.

In rocky areas, curlleaf mountain mahogany habitat is in good condition and generally occurs as mature stands mixed with juniper. In many locations, these stands are very dense—reducing their value as forage. In many areas where the topography is flatter, this habitat was used heavily by sheep and cattle in the past. In some areas, it has been lost due to fire. Mountain mahogany does not survive fire well and can be burned easily on high-productivity sites. Currently, this species has received some treatment to increase production of new growth and make sites more fire safe. Most of this management has occurred in important deer transition ranges.

***Tall Sagebrush, Snowbrush Ceanothus, and Antelope Bitterbrush***

Mountain big sagebrush habitats make up a high percentage of the acreage in the AFO area. Big sagebrush is extremely important for wintering greater sage-grouse and mule deer; also important to a whole host of sage obligate wildlife species. This habitat type generally occurs in higher elevation areas and is fairly resistant to noxious weeds and other invasives except juniper.

Juniper has reduced the quality of mountain big sagebrush habitat type across a majority of the area, and has disrupted the natural sage/grass/forb relationship. Sage-grouse, mule deer and pronghorn use sagebrush types as fall forage. Because of its presence on higher productivity soils and within varied plant associations, this habitat can be very susceptible to wildfires. In the past, it was common practice to remove sagebrush in favor of seeding grasses for livestock.

Ceanothus species are considered very important browse and cover for deer, elk, and rabbits—as well as for many small birds, including the California quail. This habitat occurs at higher elevations, mixed with sagebrush and bunchgrasses in deer summer range, and in the higher areas around Fall River. Most of these habitats appear to be in good condition except where they occur near water and where they are browsed heavily by deer and livestock

Bitterbrush is one of the most important fall forages for mule deer in northeastern California. Other animals that use this habitat include California quail, gray flycatcher, green-tailed towhee, and squirrels and chipmunks. In many cases, heavy livestock use of sagebrush has resulted in hedged plants that are difficult for wildlife to use and that are reduced in palatability (taste) and nutrition. Bitterbrush also does not tolerate higher intensity fire; in areas of wildfire, it is generally lost for at least several decades. Many of the bitterbrush stands on the AFO are older decadent stands with low diversity in age class and structure.

Current management for these habitats focuses on appropriate management of livestock. Conversions of sagebrush to other habitats (“type conversions”) to enhance livestock grazing and habitat for other wildlife have been halted because of greater concern for the greater sage-grouse and other sagebrush-obligate species. Bitterbrush stands are monitored and managed to achieve standards of no more than moderate utilization by livestock and wildlife.

***Wyoming Big Sagebrush***

Wyoming big sagebrush habitat type is important to a wide variety of sage-obligate species but is probably in the worst overall condition of any vegetation type in the AFO area. This low-elevation sagebrush type has been affected by long-term heavy grazing, lack of fire, and invasion of noxious and exotic plants. Many of the Wyoming big sagebrush stands have a pure annual grass component rather than the native bunchgrass/forb understory. Sage-obligate species occur in low-density within this vegetation type due to its overall poor condition in the AFO area. In its natural condition, the heavy native grass understory of Wyoming big sagebrush provides habitat for birds, such as grasshopper sparrow, vesper sparrow, chipping sparrow, and loggerhead shrike. This habitat type can also be important to wintering big game animals and small mammal such as the black-tailed jack rabbit.

### ***Low Sagebrush***

Low sagebrush is highly nutritious and palatable forage. Pronghorn antelope, mule deer, and sage-grouse are known to prefer this forage and often wait to migrate from it until heavy snows force them to move onto less palatable forages (e.g., Wyoming and mountain big sagebrush). In the late winter/early spring, sage-grouse are often found strutting in low sage habitats, and pronghorn can often be seen close by. Low sage is very important to pronghorn, as they are adapted to areas with low vegetation because they afford a better view of potential predators. Birds of prey make particularly good use of this habitat as it affords a good view of prey and, depending on site, few obstructions for low-level flight. Low sage often occurs in association with gravels or boulders and therefore is fairly fire tolerant, except in very dry years or where in proximity to taller sagebrush species. Current management focuses on appropriate control of livestock.

### ***Black Greasewood***

Black greasewood can be one of the taller shrub communities. In that capacity, it can provide excellent nesting cover and food for birds and small mammals. Very little black greasewood is in the AFO area. If the habitat is in good condition and plants are relatively tall, black greasewood habitat can be used as thermal cover for big game species. Northern junco, Townsend's solitaire, and mountain bluebird use this habitat. Pygmy rabbit use this habitat as well, but probably not to any great extent. Rodents found in this habitat include the chisel-toothed kangaroo rat, Great Basin pocket mouse, various ground squirrels, and Townsend's pocket gopher. Bat species found in the AFO area only infrequently use this habitat, except possibly in areas that have water.

### ***Permanent and Seasonally Wet Meadow***

Permanent and seasonally wet meadow habitats are especially important in desert environments, as many wildlife species require "free water." Meadows provide important foraging habitat for mule deer, pronghorn, small mammals, and shorebirds. Depending on the availability of shrubs, these habitats serve as important birthing grounds for large game. Many songbirds nest fairly close to meadow systems, and all the bats known in the AFO area—except Townsend's big-eared bat—feed on the abundant flying insects associated with wet meadow environments. This habitat type is also important to bank swallows, which feed on insects taken over open riparian areas. Drier meadows provide habitat for many of the rodents found in the AFO area, including deer mouse, Townsend's pocket gopher, and long-tailed meadow mouse.

Meadow habitat is highly favored by livestock, both sheep and cattle, and wild horses. In most cases, this habitat type has been the most heavily affected habitat on BLM-administered lands. In several cases, wet meadow systems have been dewatered due to erosion and lowering of the water table. In other cases, riparian vegetation has been slowly replaced with upland species such as sagebrush due to overgrazing. In the most severe cases, small meadows and springs have been converted to muddy watering holes. In some meadows, juniper invasion is also a threat. Current management involves changing grazing practices, fencing out livestock, providing offsite water for livestock, and treating noxious weeds and removing juniper.

### ***Riparian Shrub, Willow***

The riparian shrub and willow habitat makes up the least amount of potential habitat in the AFO area; however, these habitats are important for many wildlife species. Mule deer, pronghorn antelope and, occasionally, elk use this habitat type. Mule deer are known to use these areas for fawning. This habitat can easily be damaged by excessive livestock use. Willow and other woody riparian plants have been overgrazed and eliminated from many miles of streams in the field office area. Good willow presence provides habitat for a large variety of songbirds, small raptors, and small mammals, and can provide bank stability in streams that provide water to all wildlife. This habitat is also important to native fish for resting, shade, and foraging. Loss of willows and other woody vegetation from grazing has altered these habitats that are important to a wide variety of wildlife, especially songbirds.

### ***Annual Grassland***

Most of what CALVEG has mapped as annual grassland is actually nonnative exotic grasses. The dominant species are medusahead and cheatgrass. This habitat often occurs in association with dry and wet meadows and springs, and can invade and eventually dominate shrub habitats that are disturbed by ungulate grazing or frequent fires. Annual grasslands support a wide variety of native birds, rodents, and small mammals.

Perennial grassland habitats have either been replaced by mountain big sagebrush or rabbitbrush due to absence of fire (and high suppression effort), type conversion, past heavy season-long grazing, or relatively recent cheatgrass invasion. The largest stand is located on Cold Springs Mountain, resulting from a prescribed burn and where sagebrush has been slow to return into the perennial grassland. Pure stands larger than 100 acres are rare, but do occur in Mount Dome area.

## **3.25.2 Federally Listed Threatened and Endangered Species**

The following paragraphs describe the current status and distribution of wildlife species that are known or suspected to occur in the AFO area and have been listed or are candidates for listing as either threatened or endangered under the federal Endangered Species Act. These species are included because they have been identified for protection and management in the AFO area. Habitat relationships of these species are identified in Table 3.25-2, at the end of this chapter.

### ***Bald Eagle***

The bald eagle (*Haliaeetus leucocephalus*) is currently listed as threatened under the Endangered Species Act, although it is proposed for de-listing. Suitable habitat for bald eagles includes large trees for perching and nesting near lakes and large rivers. Polite et al. (1990) stated that 87% of bald eagle nest sites in California are within 1 mile of water, and that bald eagles require “large bodies of water, or free-flowing streams with abundant fish...” Shimamoto and Newman (1981) suggest that bald eagles require their food supply to be within a mile of their nest. Bald eagles are frequently seen utilizing carrion (dead cows), waterfowl, and fish; however, ground squirrel and snake remains also have been found under active nests. According to Shimamoto and Newman, suitable winter feeding sites are usually within 12 miles of bald eagle roosts.

The following information was excerpted from the Pacific Bald Eagle Recovery Plan (DOI 1986) and from Lehman (1979). Nest stands are more likely to be active if located a short distance from a persistent water body. Nest stands had 20% to less than 40% canopy cover. The nest tree is situated upslope from the water body in an exposed, prominent position, which allows for visibility in all directions. Nest tree height ranged from 76 to 150 feet, and the average diameter was 43 inches DBH. In California, 71% of the trees used were pine.

Noise and potential harassment of eagles from management activities is a concern. In a model that assesses the effects of disturbance on breeding bald eagles, researchers found that eagles responded differently to stimuli depending on the type and duration of disturbance (Grubb and King 1991). Other researchers have found that the time of year and the eagle's activity affect disturbance and have made subsequent recommendations on the need for buffers around eagles. Recommended buffer widths from human disturbance have ranged from 1500 to 1800 ft (500-600 meters) (Fraser et al. 1985, Grubb and King 1991). In the western portion of the field office, bald eagle is relatively common—many nesting territories and winter roost sites occur throughout. The large winter population uses BLM-administered lands as significant roosting areas. Consultation on bald eagle management occurred in 2001, applying all of the conservation measures necessary to protect nesting and roosting eagles. One of the main roosting areas is located in the Lava WSA.

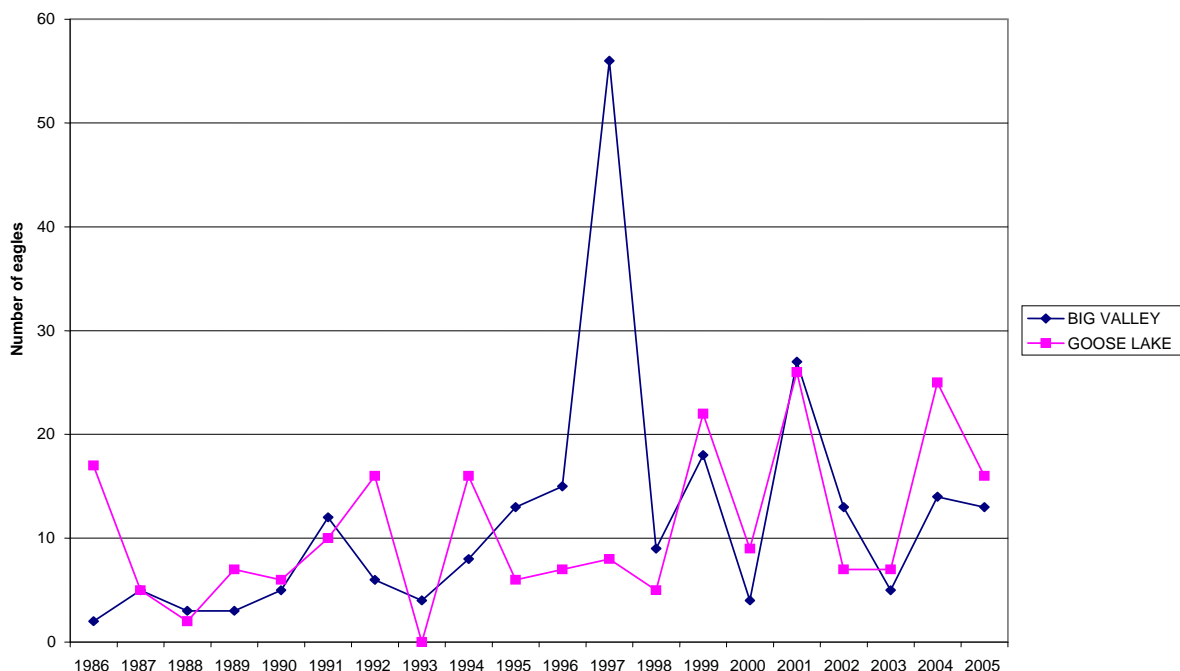
As many as 15 bald eagle nest sites occur on BLM-administered lands in the Fall River planning unit (see the Fall River Bald Eagle Management Plan). In addition, multiple nests occur in the southern portion of the planning area. Nest monitoring occurs almost yearly by various sources.

The bald eagle is common throughout the year in and around Mt. Dome BLM-administered lands. Nesting occurs on Mt. Dome, but this area is best known as one of the largest winter roost sites in California. This area, which supports between 250-300 wintering individuals, is managed under the Mount Dome Management Plan (BLM 1985).

In the eastern portion of the field office area, bald eagle also is relatively common year-round. BLM-administered lands provide important foraging habitat for bald eagle in this area. The eagles that use this area prey on waterfowl on stock ponds, human-made reservoirs, and lakes on private lands. They also prey on ground squirrels in cut agricultural fields. Nesting occurs on the Modoc National Forest in the southern portion of the Warner Mountains—approximately 10–25 miles away from common foraging areas.

A large wintering population of bald eagles uses several areas throughout the AFO (Table 3.25-2). The wintering population has increased substantially over the last 25 years, consistent with the species recovery throughout its range. During the January 26, 2006 survey a record high number of bald eagles were found on the Goose Lake survey route.

**Table 3.25-2 ANNUAL MIDWINTER BALD EAGLE CENSUS (Conducted January 7-13)**



### ***Northern Spotted Owl***

The northern spotted owl (*Strix occidentalis caurina*) is federally listed as threatened. Historical and current northern spotted owl habitat has not been identified in any of the specific land use plans in the AFO area. None of the BLM-administered lands in the AFO area are in the northern spotted owl range identified in the Northwest Forest Plan (USDA Forest Service and DOI BLM 1994) or in the extent of USFWS-designated critical habitat. Northern spotted owls have, however, been found in the high-elevation timbered portion of the Widow Peak area, in the AFO area. Multiple surveys have failed to locate any nests, and three separate consultations with USFWS personnel have been conducted for this area. In the most recent consultation, current range, timber, and recreation management was identified to pose no threats to the owls using Widow Peak. There are no historical records of this species in Modoc County.

There are not enough data to indicate a population trend or range expansion for northern spotted owl in the AFO area. It is likely that small populations have persisted in southwestern Modoc County, in forest similar to that occupied by owls to the west.

### ***Modoc Sucker***

The Modoc sucker (*Catostomus microps*) is federally listed as endangered. It is found in the Pit River and several of its tributaries. In the AFO area, Ash Creek and Rush Creek have Modoc suckers year round. These small creeks are in the Warm Springs/Big Valley watershed near Adin. In the Fall River watershed, there is very little occupied, historical, or potential habitat and there is no designated critical habitat on lands administered by the AFO. It is believed that the Modoc sucker does not currently reside in the Fall River planning unit (Reid, personal communication).

Consultation with the USFWS for Modoc sucker occurred in 2001. During that consultation, it was agreed that very little occupied, historical, or potential habitat and no designated critical habitat is on lands administered by the AFO.

The 0.25 mile of potential habitat on BLM-administered lands that occurs on Dutch Flat Creek has been fenced from livestock grazing to improve riparian habitat for Modoc sucker. Other small sections of potential habitat on Ash and Willow Creeks have not received management applications due to the large amount of private lands in these areas.

### **Lost River and Shortnose Suckers**

Both the Lost River sucker (*Deltistes luxatus*) and shortnose sucker (*Chasmistes brevirostris*) are federally listed as endangered. There currently are no known occupied habitats on BLM-administered lands in the AFO area. Periodic monitoring is performed to determine whether these suckers exist in the AFO area.

### **Shasta Crayfish**

The Shasta crayfish (*Pacifastacus fortis*), a federally listed endangered species, is present in the Fall River watershed in the AFO area. This species is found mainly in the Pit River, where BLM-administered land is a minor component of the area. Recent Endangered Species Act consultation with the USFWS (2001) reported the only potential effects on this species on BLM-administered land could occur at the Pit River Campground.

### **Pygmy Rabbit**

The pygmy rabbit (*Sylvilagus idahoensis*) recently petitioned but was denied federal listing (2005). The species depends on sagebrush, primarily big sagebrush (*Artemisia tridentata*) located in deeper soils (Csuti et al. 1997). Soil types can be loamy to ashy, and burrows are generally found greater than 72 centimeters (20 inches) deep. In Oregon, overall shrub cover at pygmy rabbit sites ranged from 21 to 36%, while bunchgrass cover was less at burrows than at random sites. Pygmy rabbit burrows are almost always under big sagebrush and only rarely in the open. In some instances, they are known to use the old burrows of badger and marmot—as well as other natural cavities or holes in rock or in the ground.

Soil and vegetation that fit the normal requirements of the pygmy rabbit exist in many locations in the AFO area, but these have not been systematically surveyed. The paucity of recent sightings suggests that the species is currently rare or extirpated in the region. Populations of this rabbit have been declining throughout its range over many decades, associated with conversion of sagebrush habitat to agricultural uses on privately held lands. At present, there are few documented sightings on lands managed by the AFO. There is little information on historical or current population sizes; trends on BLM-administered lands cannot be determined at this point (Washington Department of Fish and Wildlife 1995).

### **Yellow-Billed Cuckoo**

The yellow-billed cuckoo (*Coccyzus americanus*) is a candidate for federal listing. There are no known records for this species on BLM-administered lands in the AFO area. Yellow-billed cuckoos breed in mature riparian forests dominated by cottonwood and willow. There are two records from the nearby Modoc NWR from the 1980s, but these pertain to vagrant individuals. There are no known populations in northeastern California.

An account from the Surprise Valley (Mailliard 1927) provides some evidence of historical breeding populations, but there was no indication of the size of the population or its trends. Given that there are no known populations, it is reasonable to assume that the species had at least some presence in northeastern California up until the 1920s, but has since been extirpated.

The lack of mature riparian forest that would provide suitable habitat for yellow-billed cuckoos may be tied to current grazing management; if so, this management would not likely facilitate the development of sufficient habitat to encourage cuckoos to become reestablished in the field office area.

### ***Oregon Spotted Frog***

The Oregon spotted frog (*Rana pretiosa*) is a candidate for federal listing. At present, there are no known spotted frog populations on lands administered by the AFO. This is one of the most widely distributed amphibian species in the western U.S.; its known elevation range is 3,200–4,800 feet. California historical records indicate that this species was present on the Modoc Plateau, Pit River drainage, and in the Warner Mountains; however, on a field survey in 1995 to these historical sites, Jennings and Hayes found no individuals present.

Spotted frog is a highly aquatic species typically found in permanent water, such as streams, rivers, marshes, springs, pools, and small lakes. Spotted frogs do not occur in stagnant wetlands dominated by cattails. They prefer areas with thick algae and sparse emergent vegetation (sedges, rushes, and grasses). In this region, where snow and ice accumulate, spotted frogs are inactive during winter; most hibernate and aestivate. There are no specific data on feeding; however, the diet varies with individuals' age and size—and includes insects, arachnids, and mollusks.

Because there is no information on historical or current population sizes or range, trends cannot be determined at this point. It is likely, however, from the paucity of recent sightings (including the results of the 1995 survey by Jennings and Hayes) that the species is currently rare or extirpated in the region. Loss of habitat associated with development of agriculture and use of surface waters for irrigation, as well as large-scale grazing are likely responsible for the lack of sightings.

### **3.25.3 California State-Listed and BLM Sensitive Species**

Species status and habitat associations for the California-listed and BLM sensitive species described below are presented in Table 3.25-3.

#### ***Swainson's Hawk***

The Swainson's hawk (*Buteo swainsoni*) is state-listed as threatened. This species nests in juniper and individual conifer and hardwoods (Woodbridge et al. 1995), especially along agricultural fields and will also roost on the ground if no trees are available (CDFG 1999). Nests are often located in low-density stands of trees. Open areas of meadows or croplands are used for foraging. This bird feeds on small rodents, rabbits, birds, and arthropods—either by catching them in the air or jumping along the ground.

Banding studies have been performed in the South Pit River watershed and in the Mount Dome area. Studies were conducted to determine nest success and distribution, but there are no recent data on population size nor is there current monitoring of known pairs. Formal surveys have not occurred in recent years, but past studies demonstrate that the AFO area supports numerous Swainson's hawks and provides habitat characteristics suitable for breeding. The encroachment of juniper into formerly open habitats provides additional nesting habitat for Swainson's hawk but has reduced foraging area.

### ***Willow Flycatcher***

The willow flycatcher (*Empidonax traillii*) is state-listed as endangered. Willow flycatchers are found in larger riparian and wet meadow systems from 2,000 to 8,000 feet, and generally nest in large willow thickets over or near slow-moving water (CDFG 1999). Although there are no known breeding records on BLM-administered lands in the AFO area, recent and historical records indicate that breeding of willow flycatcher is possible in suitable habitat. Willow flycatchers breed in willow thickets, in riparian areas and wet meadow systems. There are not enough data to indicate population trends of willow flycatchers in the planning area.

### ***Bank Swallow***

The bank swallow (*Riparia riparia*) is state-listed as threatened. Bank swallows depend on vertical to near-vertical banks, cliffs, bluffs, quarries, and road cuts that they use to excavate their nests. Their nests, which are dug into cliff faces, are generally near the top of the face and near a source of water such as a stream or lake, or in a riparian area. Cliff substrate is generally of a fine-textured or sandy soil. Locally, bank swallow nesting habitat is found in stream systems with the deep “head-cuts” associated with past excessive livestock use and heavy spring runoffs and in sites used to quarry sand and gravel. This species feeds primarily on insects captured aerially over open wet meadows and other riparian areas. In migration, this species flocks with other swallows over many open habitats. (CDFG 1999)

Scattered, local breeding colonies of bank swallow are found in bank habitats associated with eroding streams and sand mining areas in Modoc County (Airola 1980). It is possible that some are established in BLM-administered wetlands in the AFO area, but the habitat is likely highly localized. There is no information on historical or current status of this species on these lands. One known colony of bank swallows occurs in the Fall River area.

### ***Greater Sandhill Crane***

The greater sandhill crane (*Grus canadensis tabida*) is a state-listed threatened species. It is commonly found in wetlands—especially along margins of shallow water, where the birds assemble a nest of floating materials over water. Nesting has been documented on islands as well. When feeding, this subspecies prefers wet meadows (especially during the breeding season) and croplands. Sandhill cranes feed on roots, tubers, grasses, and grains in croplands and also will also take earthworms, mice, snakes, frogs, crayfish, and various insects (CDFG 1999)

Several pairs of cranes have been found nesting on BLM-administered lands and in taller, wet, grassy private pastures within the AFO area. Nesting areas and nest success have not been well documented. The population trend for greater sandhill cranes overall has been increasing throughout Modoc County; this is the probable trend on BLM-administered lands as well.

### ***Golden Eagle***

The golden eagle (*Aquila chrysaetos*) is on BLM’s list of sensitive species. Golden eagles are long-lived and loyal to their territories (Steenhof et al. 1997). Locally, most golden eagles use cliffs for nesting, although some may use large trees (Menkens and Anderson 1987). A study by BLM biologists in northeastern California showed that jackrabbits and cottontail rabbits comprised over 90% of the biomass consumed by golden eagles in the breeding season (Bloom and Hawks 1982).

Many golden eagle nest sites occur in the AFO area and the species is present within all watersheds. Management for this species is restricted to applying limited operating periods (LOPs) during the nesting season around known active nests. No dates are fixed for these LOPs; the BLM Wildlife Biologist relies on past survey data to determine the dates for each project. Habitat quality may vary between the west and east and northern portions in the AFO area due to wetter conditions and different vegetation types in the Fall River area. Juniper encroachment is probably degrading habitat value by reducing foraging conditions in the AFO area. Additional occupied nests could likely be found with additional survey effort. Currently, it is unknown how many of the known nests are occupied. The golden eagle population trend is unknown, but there is no evidence of decline.

### ***Ferruginous Hawk***

The ferruginous hawk (*Buteo regalis*) is a BLM sensitive species. It is commonly found in association with open grasslands, sagebrush flats, desert shrub, and juniper woodland fringes. The ferruginous hawk is uncommon but is found locally during the winter months at lower elevations. It generally nests in lone trees, but may also use low cliff faces, buttes, cut banks or shrubs; it is also known to nest in other natural or human-made elevated structures. This bird roosts in open areas in lone trees, on utility poles, and sometimes on shrubs. The most common food sources are rabbits, ground squirrels and mice; but this hawk may also take birds, reptiles, and amphibians. Water requirements are probably met from prey. (CDFG 1999)

There are a few historical records of this species during the breeding season and several old records of pairs in Modoc County for several years during the 1980s and 1990s. Ferruginous hawk is currently an uncommon winter visitor and migrant through northeastern California; although it has been documented in most of the watersheds in the AFO area. No known formal surveys have been conducted for ferruginous hawks in the AFO area.

### ***Burrowing Owl***

The burrowing owl (*Athene cunicularia*) is a BLM sensitive species. It is a year-round resident of open grasslands and sagebrush stands. It was once found locally in the Madeline Plains area. This small owl uses the burrows of ground squirrels and other small mammals to make its home and hunts from low perches where it may pounce on its prey. Prey items are commonly insects or very small rodents. Burrows and shrubs are important to this species for thermo-regulation. Rodent-eradication campaigns often lead to abandonment of the area by burrowing owls. In areas where burrows are scarce, human-made structures such as pipes, culverts, and nest boxes have been used for nesting. Water requirements are not well understood, but they do take free water when available (CDFG 1999).

Burrowing owls are known to occur at the Madeline Plains, but no other documented sightings have been made in the past few decades. Most observations have been in association with culverts and other disturbed areas. This species has likely declined in northeastern California, as there are very few records in Modoc County since the mid-1980s. The cause of this species' decline in Modoc County is unclear, although ground squirrels have been poisoned in the past on private lands and are "locally controlled by shooting."

Large areas of private land have also been converted to agricultural uses in the Madeline Plains area, causing loss of habitat for burrowing owls. There are no consistent and systematic surveys for these owls in the AFO area.

### ***Greater Sage-Grouse***

The greater sage-grouse (*Centrocercus urophasianus*) is currently listed by BLM as a sensitive species and is recognized as sensitive by the State of California. As the name implies, this species is heavily dependent on sagebrush habitats, and is considered a sagebrush obligate species. Historical and active breeding strutting grounds (“leks”) on BLM-administered lands are located primarily in low sagebrush habitats. Sage-grouse use sagebrush stands as both winter and nesting habitat; leks are often located in open areas surrounding sagebrush (Connelly et al. 2000). Sage-grouse most often nest under sagebrush shrubs; successful nesting habitat contains tall grass cover (Gregg et al. 1994) in association with this sagebrush. Although many nests have been found in lower quality habitats, these are almost always unsuccessful due to nest abandonment and predation. Brood-rearing habitat is wet meadow and riparian habitats where the young can find abundant insects. These insects are a critical food source to young sage-grouse during their first few weeks of life.

The sage-grouse occur throughout the AFO planning unit and has a long history of presence in the Madeline Plains. Currently, seven active strutting grounds are monitored yearly and another dozen or so historical strutting areas that are no longer used by grouse.

Radio telemetry studies by CDFG determined the “plains” to be a significant summering area for sage-grouse. These studies showed that some birds that use the plains during summer have moved more than 50 miles between seasonal use areas. Upland habitat quality is declining in sagebrush, and only about 10% of the planning unit is in good condition for sage-grouse and other sage-obligate species. The spread of noxious weeds, many decades of heavy grazing, and juniper encroachment have contributed to considerable degradation of sagebrush/grassland habitat. Projects to improve sage-grouse habitat will be necessary to maintain this population of grouse.

Sage-grouse have a long history of decline in Modoc and Lassen Counties (Hall personal communication). Sage-grouse are commonly found throughout the range of big sagebrush, but numbers have been declining throughout the West for many years. Anecdotal information from older generation ranchers suggests that several thousand birds existed in Modoc and Lassen Counties during the 1940s and 1950s. Historical information about sage-grouse in these counties is not available before 1980; however, accurate lek count information has been obtained since the early 1980’s.

The AFO contains three sage-grouse population management units (PMU): 1) Buffalo-Skedaddle, 2) Likely Tablelands/Rocky Prairie, and 3) Devil’s Garden/Clear lake. These PMUs cover several million acres of potential sagebrush habitat in northern California and Nevada. These sub-units are being analyzed in a conservation planning effort by BLM’s Eagle Lake, Surprise, and AFOs, in cooperation with the CDFG and the Nevada Division of Wildlife.

Current survey efforts have found active historical leks and a couple of previously unknown active leks. Currently, only 10% of all known historical leks are documented to be active, 60% are thought to be inactive, and there is not enough information to determine the status of the remaining 30%. The population of sage-grouse in the Cold Springs area has been increasing during the past few years due to improved habitat from prescribed burning. The Likely Tablelands population is less than 50 total birds and is at risk of extirpation. The Hayden Hill population is currently less than 30 birds and it too is in danger of extirpation.

### ***Juniper Titmouse***

The juniper titmouse (*Baeolophus ridgwayi*) is a BLM sensitive species. It is common in a variety of habitats but is found primarily in association with juniper and desert riparian areas. It seems to prefer juniper woodlands rather than riparian woodlands. The juniper titmouse roosts in cavities of trees or snags, nests in natural or human-made cavities (e.g., woodpecker holes or other natural cavities, or nest boxes). Its nest is generally lower than about 30 feet and it often breeds near water. Juniper titmouse feed on spiders, insects, berries, and seeds gleaned from twigs, branches, and the bark of trees. It is vulnerable to the usual woodland predators: hawks and small mammals (CDFG 1999).

Little is known about this species beyond its occurrence in particular habitat types. These habitats are plentiful on lands managed by the AFO.

### ***Tricolored Blackbird***

The tricolored blackbird (*Agelaius tricolor*) is a BLM sensitive species. There are scattered, local breeding colonies of tricolored blackbirds in Modoc County; it is possible that some are established in BLM-administered wetlands in the AFO area. Yearly sittings are common, however, there is no information on historical or current status of this species in these wetlands or any other habitats in the AFO area.

### ***BLM Sensitive Bats***

A variety of bat species, including BLM sensitive Yuma myotis (*Myotis yumanensis*), fringed myotis (*Myotis thysanodes*), long-eared myotis (*Myotis evotis*), small-footed myotis (*Myotis ciliolabrum*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), and Townsend's western big-eared bat (*Plecotus townsendii*) may be found throughout the field office area due to a high amount of suitable habitat. Rock outcrops, canyon cliffs, trees, and mineshafts provide roosting and maternity habitats. Northeastern California—unlike other areas of the west—have relatively low mineral potential; therefore, historic mining shafts that provide important bat habitat elsewhere are very limited on lands managed by the field office. A variety of bat surveys have been conducted on BLM-administered lands in the AFO area and a large variety of species have been found. Significant nursery caves have been found, but there is much more potential habitat where survey has not been conducted.

**Yuma Myotis.** Yuma myotis inhabit open woodlands and forests with streams, stock tanks, and ponds over which they feed and drink. They roost in buildings, bridges, mines, caves, and crevices, as well as abandoned swallow nests. These sites also are used for maternity colonies. This species has a relatively poor urine-concentrating ability and must therefore drink water regularly. Winter habitat is poorly understood, but apparently this species hibernates (Nevada Bat Working Group 2004 and CDFG 2002).

**Fringed Myotis.** Fringed myotis occur in a variety of habitats, including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. They forage primarily on beetles on or near vegetation but also will prey upon moths and other flying insects over water and open areas. Fringed myotis have poor urine-concentrating ability and must therefore drink water regularly. Day and night roosts are often in buildings and mines but also in rock crevices and in snags. Trees are probably the most important day roosts; caves and mines are used only at night. This species usually forms nursery colonies numbering up to 200 adult females, but males are often found roosting alone or in small groups. This species does not migrate and hibernates in caves and mineshafts (Nevada Bat Working Group 2004, CDFG 2002).

**Long-Eared Myotis.** Long-eared myotis are found primarily in juniper and higher-elevation coniferous forests. Long-eared myotis feed along open habitat edges, in open areas, and over water. They avoid highly arid areas and are closely associated with water, as this species has a relatively poor urine-concentrating ability. Nursery colonies and roost sites consist of buildings, crevices, snags, and the spaces under bark. Caves are used primarily as roost sites. The long-eared myotis forage on beetles, moths, spiders, and flies over water, trees, and shrubs. This species does not migrate, but little is known of its winter hibernation habits. (Nevada Bat Working Group 2004, CDFG 2002)

**Small-Footed Myotis.** Small-footed myotis occur in a variety of habitats, including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. Summer and winter ranges appear to coincide. Often seen foraging over water and trees, these bats prey on aerial moths, flies, beetles, and bugs. Small maternity colonies are found in buildings, caves, and mines. These sites, as well as bridges and bark crevices can be used for roosting. Often seen drinking water soon after emerging, small-footed myotis prefer humid roost sites. They have a high tolerance for cold and can be found in drafty sites less tolerable to other myotis. The species is known to hibernate and often can be found feeding or roosting with other bat species. (Nevada Bat Working Group 2004, CDFG 2002)

**Pallid Bat.** Pallid bats occur in a variety of habitats, including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. They prey primarily on large arthropods on the ground, including beetles, crickets, and centipedes, but also will take moths in flight.

Their day roosts include trees, rock outcrops, mines, caves, buildings, and bridges. At night, they roost primarily under bridges, and in caves and mines. They do not migrate and sometimes awake from hibernation during winter to forage and drink. (Nevada Bat Working Group 2004, CDFG 2002)

**Spotted Bat.** Spotted bats occur in a variety of habitats, including desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands, and pine forests. They are closely associated with cliff faces, where they primarily roost. They sometime roost during winter in caves and have been documented roosting in buildings. Spotted bats prey on moths and other flying insects, most often over canyons, riparian vegetation, or open meadows and shrublands. They are not known to congregate as they often forage and roost alone. They do not migrate and sometimes awake from hibernation during winter to forage and drink. (Nevada Bat Working Group 2004, CDFG 2002)

**Townsend's Western Big-Eared Bat.** Townsend's western big-eared bats occupy a variety of habitats, including late-seral stage forests and riparian areas. Foraging habitats are varied, but they primarily prey on moths. These bats roost exclusively in caves, mines, and buildings. Caves need to meet specific microclimatic conditions for successful roosting, and this species is very susceptible to disturbance (Campbell and MacFarlane 2000). Potential habitats for this species include almost all vegetation types; however, the presence of caves, mines, buildings and other human-made structures is essential (Nevada Bat Working Group 2004, CDFG 2002).

Other than buildings, potential roosting and reproduction habitats (e.g., small caves, habitable mines, and other human-made structures) have not been inventoried in the AFO area. Because potential habitat for this species includes almost all vegetation types, quantifying acres of potential habitat for the species is difficult. This bat could forage over literally tens of thousands of acres, depending on the presence of caves and other features.

### ***Northern Sagebrush Lizard***

The northern sagebrush lizard (*Sceloporus graciosus graciosus*) is a BLM sensitive species. This lizard is widely distributed in the Great Basin shrub and juniper woodland habitats. It almost exclusively eats small arthropods, especially ants and beetles. When disturbed, it takes cover in low shrubs, boulders, and crevices. It uses the ground, low branches, and rocks for basking. Eggs are laid in a small hole dug a few centimeters deep in loose soil at the base of a shrub. This lizard may use crevices and small rodent burrows for hibernating. It is believed that this lizard does not need free water; it is considered an important prey species for some snakes and predatory birds (CDFG 1999).

Northern sagebrush lizard is common in the region; however, there is little to no information available beyond common sightings regarding lizards on BLM-administered lands in the AFO. No surveys have been conducted for sagebrush lizard or its habitats in the AFO area.

### **3.25.4 Ungulates**

The principal ungulate species that require management consideration in the AFO area include mule deer, black-tailed deer, Rocky Mountain elk, pronghorn antelope, and California bighorn sheep. Habitat relationships for these big game mammals are summarized in Table 3.25-3.

#### ***Mule Deer***

Habitat for mule deer (*Odocoileus hemionus*) includes early to intermediate successional forests and brushlands; they prefer a mosaic of various-aged vegetation that provides woody cover, meadow and shrubby openings, and free water (Zeiner et al. 1990).

To aid in thermo-regulation, deer use various topographic aspects, south in the winter and north in the summer. Heavy shrub and tree cover also aids in thermo-regulation. Deer need adequate supplies of highly digestible, succulent forage for optimal growth and productivity. (Anderson and Wallmo 1984) According to CDFG (1998), foraging habitat is a limiting factor for mule deer in northeastern California. Important habitats for deer on BLM lands managed by the AFO include all seasonal use ranges. These ranges are important as areas where deer feed in preparation for fawning in spring, and to gain weight for winter. These areas typically support bitterbrush (a key seasonal browse plant), mountain mahogany, oak woodlands, big sagebrush, and juniper; they also should have a good ground cover of forbs.

Long-term studies show that overall deer numbers have been declining for several decades throughout California. Juniper expansion has caused a major decline in understory vegetation and shrub reproduction and health over a large portion of the field office area. High-density juniper is the single most important limiting factor in high-quality deer forage. Without large-scale habitat improvement, the deer population trend is likely to continue downward. BLM and CDFG work together to meet habitat objectives set forth in multiple herd management plans through the region.

#### ***Rocky Mountain Elk***

Rocky Mountain elk (*Cervus elaphus nelsoni*) eat a wide variety of forage, including grasses, forbs, twigs, and shrubs. This large ungulate is generally found in heavily timbered areas with a dense understory of brush. Woodlands serve as important thermal and hiding cover for the species. In the AFO area lands, this habitat type is satisfied by juniper, aspen, and pine woodlands in proximity to wet meadows. In good elk habitat, the distance between open water should be no more than 2 miles (3.2 km) (Schmidt and Gilbert 1978). During the winter months, elk generally satisfy their water needs by eating snow.

Dense, brushy areas with water close by serve as calving grounds for the elk. The species is known to require relative seclusion from humans; however, management is needed to prevent over-population (CDFG 1999).

Only a few elk are thought to use this area, and there are no established seasonal use areas. Elk continue to increase throughout northeastern California and are expected to continue to increase as vegetation management continues to improve upland and riparian conditions.

### ***Pronghorn Antelope***

During pre-settlement, pronghorn (*Antilocapra americana*) were one of the most abundant game species in California; however, by around 1923, there were only approximately 1,000 animals due to “adverse land use and unregulated hunting” (Pyshora 1977). Pronghorn prefer open rangeland types that support a variety of vegetation types. Areas with low shrubs typify summer habitat, with a diversity of native grasses and forbs (Gregg et al. 2001). They do not appear to require open water if there is sufficient moisture in the vegetation (Reynolds 1984, O’Gara 1978). Although forbs are an important component of the diet, browse is the dominant food ingested (Pyshora 1977). Forbs are preferred forage and contribute a high portion of the protein and minerals to the pronghorn diet. Pronghorn benefit from management that favors forb production. Pronghorn also make extensive use of alfalfa fields for feeding and bedding, where these are available.

Surveys conducted in 2003 for pronghorn found that the overall population had reached the lowest point in several decades (Shinn, personal communication).

Several years of drought have been the main contributor to the depressed populations. Juniper encroachment and increasing noxious weeds and annual exotic grasses is contributing to poor habitat conditions in some areas.

### ***California Bighorn Sheep***

Habitat for California bighorn sheep (*Ovis canadensis californiana*) includes steep, rocky terrain for escape cover and bedding opportunities adjacent to open vegetation for foraging and water. High-quality bighorn sheep habitat (steep areas) generally consists of steep terrain (to discourage predation) located within ¼ mile of water. This species can be found in a variety of habitats, including big and low sagebrush, juniper woodland edges, perennial grasslands, and bitterbrush. Although woodland areas can be used, this species prefers low-growing vegetation in order to better spot predators (CDFG 1999).

Currently, no known populations of California bighorn sheep exist on lands administered by the AFO. There have been re-introductions on nearby districts since the late 1980s. California bighorn sheep are found on the Warner Mountains east of and adjacent to the AFO area.

## **3.25.5 Native and Nonnative Fish and Aquatic Species**

The extent and condition of fish populations and other aquatic species varies considerably between the watersheds in the AFO area. In the drier northern watersheds (Goose Lake and Tulelake/Devils Garden), there is a limited amount of aquatic habitat, and no important habitat areas on BLM-administered land. In the Goose Lake watershed, only a small stretch of Lassen Creek provides aquatic habitat. This small stream section provides important habitat for Goose Lake sucker, Goose Lake tui chub, pit sculpin, speckled dace, Goose lake lamprey, and Goose Lake redband trout. Most of these species use Lassen Creek for spawning (CDFG 1992).

The Madeline Plains watershed also supports a minimal amount of aquatic habitat. Two perennial streams and several ephemeral drainages support primarily dace and roach. CDFG stocks several large reservoirs in the area with trout, bass, and catfish.

The other watersheds in the AFO area (Fall River, Warm Springs/Big Valley, and North Fork/South Fork) contain a more diverse and extensive group of aquatic habitats. More than 20 species of fish are found in these watersheds, including redband and brown trout, dace, roach, lamprey, sculpin, pike minnow, and tui chub. In the North Fork/South Fork watershed, Fitzhugh Creek and Pine Creek provide good trout fishing habitat. The Fall River watershed supports a good coldwater fishery and hosts the protected Modoc sucker and the Shasta crayfish, although these species are not believed to exist on BLM-administered lands. The Warm Springs/Big Valley watershed includes a wide range of fish species, including the protected Modoc sucker. This fish occupies non-critical habitat on BLM-administered land in Ash and Dutch Flat Creeks in the vicinity of Adin.

In summer 2003, aquatic habitats were assessed for 20 streams in the AFO area, and 12 streams were surveyed for fish species presence. The assessment found that most streams lacked sufficient qualities to be rated as good-quality stream habitat for coldwater fish. Instream aquatic species composition overall was generally good except in stream reaches with abundant silt, compared to a standard that 75% of the riffle-rubble of a streambed should be free from sedimentation (Maser and Thomas 1986) in streams supporting native fishes. Sedimentation varied greatly among streams that were assessed. Most streams also lacked adequate pool habitat and quality. Quality was rated based on several factors, including size, depth, and amount and type of pool cover.

Possible pool class ratings ranged from 1 to 5, with 1 having the most favorable attributes. Average pool class rating was 3.9, with an average stream rating between 3 and 5. As a rule of thumb, a 50:50 mix of riffle and pool habitat is considered good for supporting fish populations.

Pools are used for resting, avoiding danger, and as a habitat to escape warmer, shallower water, whereas riffles increase oxygen concentrations and support more numerous, diverse, and larger macro-invertebrates. In surveyed stream reaches, pools occupied 43% of the stream habitat, suggesting good overall habitat quality.

This number, however, must be taken cautiously because surveys occurred over several months when water flows changed dramatically in some streams. Also, different streams naturally have different pool-to-riffle ratios based on geology, topography, and availability of instream substrates (e.g., logs and boulders).

Due to time and budget constraints, not all streams on BLM-administered lands could be surveyed for fish presence and habitat. Sucker roach, speckled dace, redband shiner, brown and redband trout, lamprey, and chub were the most common fish detected. There are no specific measurements of occupied or potential habitat for most fish species, although speckled dace appear to be present in all fourth-order (mid-sized) watersheds in the AFO area. Coldwater fish species are mainly found in the major streams flowing from mountain slopes but can also be found as planted populations in some reservoirs. Coldwater habitats supported rainbow trout, introduced brown trout, and a native redband trout. Approximately 32 miles of coldwater stream are available to the public in the AFO area.

Other small systems either have the potential for coldwater fisheries or are surrounded by private land and therefore are inaccessible to the public. Lack of control of water flows is a challenge for maintaining healthy fish populations. Many fisheries are associated with large, private upstream irrigation reservoirs. Water flows can be sporadic, depending on the irrigation releases.

The differences in flows from the natural timing of runoff, alters food production and spawning characteristics of the streams, often in ways that are not consistent with those needed for fish to maintain healthy instream populations. Raw data have been collected for the assessment of streams for habitat quality and their potential to support native fishes, but these data have not been summarized.

### **3.25.6 Native Wildlife and Special Habitats**

#### ***Upland Gamebirds***

Native gamebirds within the AFO area include sage-grouse, California quail, mountain quail, mourning dove, and blue grouse. Quail and dove are the most actively hunted species. Habitat varies greatly for these species and encompasses nearly all vegetation types in the AFO area.

California quail are present in many areas in the AFO area and appear to have increased in recent years. Management for quail has included development of brush piles and watering sites. No other special management considerations have been implemented for blue grouse, dove, or mountain quail. Except for sage-grouse lek counts in spring, no surveys for upland gamebirds are conducted in the AFO area.

#### ***Waterfowl***

Waterfowl occur on almost all water bodies in the AFO area. Persistent water sources (mainly reservoirs and streams) usually contain water during the nesting season, but the amount of vegetation associated with these water sources varies due to prior-year grazing practices and vegetation growth response. Past management for waterfowl included creating nesting islands, installing nest platforms, and installing some fences to exclude livestock.

Interest in waterfowl production and waterfowl hunting has been very high in Modoc County. Waterfowl attract hundreds of people each year into the area for viewing in spring and hunting in fall. Waterfowl production has been declining in the AFO due to lack of maintenance of waterfowl habitat enhancements. Several reservoirs with nesting islands have not received maintenance for many years. Creation of new islands and maintenance of the old islands would benefit production. Fences that were constructed to exclude livestock from waterfowl areas are also in need of maintenance. The potential for waterfowl production in spring is good, but current management has not emphasized maintenance of waterfowl enhancement features.

#### ***Other Terrestrial Wildlife***

Various sources were used to derive lists of species known to exist in the AFO area. Appendix G shows species known to be present on lands managed by the AFO. Data from earlier BLM land use plans, current surveys, and local knowledge were used to derive the species lists. Some taxa, such as invertebrates, have not been surveyed or have been surveyed only at very low levels. These taxa may exist in high numbers and varieties, but there are no supporting data. Other taxa, such as songbirds, have been surveyed more heavily but only in certain habitats (U.S. Geological Survey 2003). Therefore, trends can be assessed for some areas and habitat types.

### 3.25.7 Nonnative Wildlife and Invasive Species

#### ***Turkey***

Only a few wild turkeys (*Meleagris gallopavo*) currently inhabit the AFO area. These small populations were introduced but are currently not managed by BLM or CDFG. No data are available on population trends for this species in the AFO area.

#### ***Chukar***

Chukar partridge (*Alectoris chukar*) are introduced upland gamebirds that inhabit steep rocky areas that support grasses. No data are available on population trends for this species and very few if any population currently occur in the AFO area.

#### ***Invasive Species***

No nonnative wildlife and fish species have been identified as management issues for native wildlife within the AFO Area. The nonnative European starling has the potential to compete for nest sites with some native species. The brown-headed cowbird, an obligate parasitic nester native to North America, has expanded its range only recently into the region. The cowbird has affected nesting success of some species in northern California, at least locally (Airola 1985).

A number of nonnative warm water and coldwater sportfish and the bullfrog have been established in waters on BLM-administered lands. Many of these waters have been created or modified by impoundments on public and private lands and by water use practices that favor nonnative species. Non-native species have potential to compete with and prey upon native species of fish and amphibians in these waters.

**Table 3.25-3** Special Status and Important Game Species, and Associated Habitat Types, in the Alturas Field Office Area

Species	Special Classification	Streams/ Riparian	White Fir	Ponderosa Pine	Western Juniper	Quaking Aspen	Curleaf Mountain Mahogany	Tall Sagebrush/ Antelope Bitterbrush/ Snowbrush Ceanothus	Low Sagebrush	Black Greasewood	Shadscale/ Winterfat	Permanent and Seasonally Wet Meadows	Subalpine Bunchgrasses	Barren	Playa	Rock
Bald eagle	Federal – threatened		X	X											X	
Shasta crayfish	Federal – petitioned	X														
Modoc sucker	Federal – petitioned	X														
Lost River and shortnose suckers	Federal – petitioned	X														
Northern spotted owl	Federal – petitioned		X	X												
Pygmy rabbit	Federal – petitioned				X			X	X	X	X					
Oregon spotted frog	State – threatened	X										X				
Yellow-billed cuckoo	State – threatened	X														
Swainson's hawk	State – threatened	X			X				X		X	X				
Bank swallow	State – threatened	X	X		X	X	X	X	X	X		X	X		X	
Greater sandhill crane	State – threatened	X										X				
California bighorn sheep	State – threatened	X		X	X	X	X	X	X	X	X	X	X		X	
Golden eagle	BLM sensitive	X	X	X	X	X	X	X	X	X	X	X	X		X	
Ferruginous hawk	BLM sensitive				X	X	X	X	X	X	X	X	X		X	

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Burrowing owl	BLM sensitive	X			X			X	X	X	X	X		X	
Greater sage-grouse	BLM sensitive	X			X		X	X	X	X	X			X	
Juniper titmouse	BLM sensitive			X	X										
Tricolored blackbird	BLM sensitive	X									X				
Long-eared myotis	BLM sensitive	X	X	X	X		X	X	X					X	
Small-footed myotis	BLM sensitive	X		X				X						X	
Long-legged myotis	BLM sensitive	X	X	X	X		X	X	X	X				X	
Yuma myotis	BLM sensitive	X	X	X	X		X	X	X	X				X	
Townsend's western big-eared bat	BLM sensitive	X	X	X				X							
Northern sagebrush lizard	BLM sensitive		X		X		X	X	X					X	
Mule deer	None	X	X	X	X	X	X	X	X	X	X	X		X	
Rocky Mountain elk	None	X	X	X	X	X	X								
Pronghorn antelope	None	X		X	X		X	X	X	X				X	